BRITISH COLUMBIA
MINISTRY OF FORESTS AND RANGE

Merritt Timber Supply Area

Rationale for Allowable Annual Cut (AAC) Determination

Effective July 1, 2005

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Table of Contents

Objective of this Document....1
Description of the Merritt Timber Supply Area....1
Critical issue: Epidemic mountain pine beetle infestation....2
Expedited process for an urgent AAC determination to address the infestation....2
History of the AAC....3
New AAC determination....4
Information sources used in the AAC determination....4
Role and limitations of the technical information used....5
Statutory framework....6
Guiding principles for AAC determinations....6
The role of the base case....8
Base case for the Merritt TSA....9
Consideration of Factors as Required by Section 8 of the *Forest Act*....10
Land base contributing to timber harvest....10
- general comments....10
- inoperable areas and unstable terrain....11
- environmentally sensitive areas....12
- problem forest types....12
- riparian management....13
- archaeological and cultural heritage resources....13
- heritage trails....15
- roads, trails and landings....15
- grassland conversion....15
- woodlot licences....15
- protected areas strategy....16
- TSA boundary....17
- smallwood pine....17
Existing forest inventory....17
Expected rate of growth....18
- site productivity estimates....18
- operational adjustment factors....20
- single tree selection....21
- genetic worth....21
- minimum harvestable ages....22
Regeneration delay and impediments to prompt regeneration....22
Not-satisfactorily-restocked areas....22
Silvicultural systems....23
Incremental silviculture....23
Utilization standards....24
Decay, waste and breakage....24
Integrated resource management objectives....25
- cutblock adjacency, forest cover and green-up....25
- integrated resource management (IRM)....26
- scenic areas....26
- ungulate winter range and elk corridors....27
- community watersheds....28
- grizzly bear management....28
- landscape-level biodiversity and old forest retention....28

- wildlife tree patches 29
- identified wildlife 30
- community fire interface 30
Other information 31
- harvest sequencing 31
- actual harvest level 32
- Innovative Forest Practices Agreement 32
- Land and resource management planning 32
- First Nations considerations 33
Alternative harvest flows 35
Community dependence on the forest industry 36
Minister's letter and memorandum 36
Local objectives 37
Forest health 38
Unsalvaged losses and small scale salvage 38
Mountain pine beetle epidemic 39
Reasons for Decision 43
Determination 45
Implementation 46
Appendix 1: Section 8 of the *Forest Act* 48
Appendix 2: Section 4 of the *Ministry of Forests Act* 50
Documents attached: 50
Appendix 3: Minister's letter of July 28, 1994 50
Appendix 4: Minister's memo of February 26, 1996 50
Appendix 5: List of Submissions and Responses Received 50

Objective of this Document

This document is intended to provide an accounting of the factors I have considered and the rationale I have employed as chief forester of British Columbia (BC) in making my determination, under Section 8 of the *Forest Act*, of the allowable annual cut (AAC) for the Merritt timber supply area (TSA). This document also identifies where new or better information is needed for incorporation in future determinations.

Description of the Merritt Timber Supply Area

The Merritt TSA, approximately 1.13 million hectares in total area, is administered from the BC Forest Service (BCFS) Cascades Forest District office in Merritt, BC along with a field office in Princeton, BC. The Merritt TSA is one of fifteen TSAs lying within the Southern Interior Forest Region of BC.

Approximately 17,000 people live in the TSA with about 60% of the population residing in the major communities of Merritt and Princeton. Other smaller communities include Tulameen, Brookmere, Missezula Lake, Douglas Lake, Lower Nicola, East Gate, Spences Bridge, Osprey Lake, Allison Lake and Aspen Grove. First Nations traditional territories include Nlaka'pamux, Okanagan and Shuswap Nation while First Nations communities include Coldwater, Cook's Ferry, Nooaitch, Shackan, Upper Nicola and Lower Nicola. The public sector, forestry and tourism are the major employment sectors, with agriculture, construction and mining also contributing to the local economy.

Numerous natural resources occur within the Merritt TSA. These include timber, forage, minerals, water, fish, wildlife, recreation and tourism resources. Extensive grassland and forested areas provide important forage for both livestock and wildlife.

The predominant tree species is lodgepole pine which occupy about two-thirds of the timber harvesting land base in the Merritt TSA. Forests in the TSA also include Douglas-fir, spruce, ponderosa pine, trembling aspen and subalpine fir.

The Merritt TSA supports a diversity of habitats for fish and wildlife. At lower elevations, mule deer, moose, black bear, several furbearers, and many species of birds and amphibians are common. Grizzly bears also occur within the TSA although their population is low. The TSA's numerous rivers and lakes support several fish species including rainbow trout and kokanee. Significant demands are placed on water resources in the TSA for domestic and agricultural purposes.

Residents and tourists enjoy several recreation and tourism activities in the TSA including hiking, camping, fishing, hunting, wildlife viewing, boating, mountain biking, snowmobiling and ski-touring.

Critical issue: Epidemic mountain pine beetle infestation

Mountain pine beetle epidemics are natural events, however, the current infestation has reached an unprecedented level in BC's history. Provincial annual aerial survey data shows the beetle affected about 7 million hectares in 2004. Of the total area affected, 11% sustained severe mortality, 26% moderate mortality and 63% light mortality.

In 2003, an aerial forest health survey of the Merritt TSA indicated 7500 hectares of mountain pine beetle infestation. The 2004 aerial survey indicates a 30 000 hectares of infested area, a four-fold increase despite aggressive management strategies employed in the TSA to control the beetle. An estimated 4.5 million cubic metres of pine volume in the timber harvesting land base is currently affected by the beetles. Although the expansion of the mountain pine beetle in 2005 will not be known until the early summer when the attacked trees turn red, current indicators suggest the a significant expansion in infested stands within the TSA can be expected.

Lodgepole pine is the leading component of 70% of the stands in the Merritt TSA, making up 50% of the volume in the timber harvesting land base. Vast areas of mature and over-mature lodgepole pine stands in the TSA, as well as immature stands, are being threatened. Potentially affected stands could substantially affect timber supply in the short and mid-term if the infestation continues to expand and if no corrective action is taken.

The mountain pine beetle epidemic is at the early stage so timely management intervention may avert an exponential expansion of the infestation, and associated economic and environmental impacts. For this reason, this urgent review of the timber supply and AAC in the Merritt TSA has been conducted.

Expedited process for an urgent AAC determination to address the infestation

Prompt harvesting of infested stands in which beetles are still present, and susceptible stands that are likely to be infested, can reduce the rate of spread of the beetle population. The current AAC is nearly completely dedicated to harvesting infested or susceptible stands. Even so, without an increased harvest level, current efforts are insufficient to address the epidemic. The current AAC does not include sufficient volume to increase the harvest to the level necessary to reduce the risk of an uncontrollable outbreak. This summer 2005 the mountain pine beetle will take flight and spread to infest additional stands in the Merritt TSA. There is an opportunity to increase the harvest of currently infested and susceptible stands to reduce the spread of the epidemic provided prompt [illegible]is taken. This includes providing a timely AAC determination.

In contemplation of the need to provide remedies for these and similar situations, the *Forest Act* (section 8(9)(e)) requires the chief forester, in determining AACs, to consider *abnormal infestations in and devastations of, and major salvage programs planned for, timber on the area.*

In October 2004, the Cascades Forest District Manager requested an urgent review of the timber supply in the Merritt TSA and consideration of an AAC uplift of 1 million cubic metres for 5 years. The request to urgently consider an uplift was in response to the need for timely and aggressive harvesting intervention of infested and susceptible (high risk) stands at the early stages of the epidemic in order to reduce the expected increase in mountain pine beetles in the TSA.

In response to the need to address the current mountain pine beetle infestation for the Merritt TSA, an expedited review process was undertaken. This included: an assessment of the epidemic and how it could be controlled by the Nicola-Similkameen Innovative Forestry Society (NSIFS), assessments by BCFS staff on the epidemic, sensitivity analyses associated with different AAC uplift and beetle expansion scenarios, and a public discussion paper distributed in April 2005 where comments were solicited and received.

Having considered the rapid increase in the mountain pine beetle population in the Merritt TSA, as well as the proximity of the infestation to a large area of the beetle's preferred host – mature lodgepole pine – and the potential effects of the infestation on the standing timber inventory, on future timber supply and on other values in the TSA, I became satisfied that the epidemic indeed poses an immediate and severe risk to the TSA. Having reviewed the information about the current epidemic, I became further satisfied that an early AAC determination, with particular weight given to considerations under section 8(8)(c) of the *Forest Act*, could be crucial assistance in remedying some of the serious problems related to the mountain pine beetle infestation.

On this basis, I have proceeded to make such a determination in as timely a manner as possible, giving consideration to all the land use, forest growth, forest management, social and economic and other factors required by the statute to be considered. This rationale describes my considerations and reasoning on which my determination is based.

I am indebted to BCFS staff in the Cascades Forest District, the Southern Interior Forest Region, and the Forest Analysis Branch for their professional dedication, under pressure in this abbreviated process, to maintaining the high standards of investigation and presentation that have helped me to make a determination which I am confident is supported by the best available information. I am also indebted to the NSIFS for their 2003 timber supply analysis and their assessment of the epidemic and how it could be contained, and to the many members of the public and First Nations who kindly provided comment during the review process and at various meetings and open houses. I have taken all this information into account in my determination.

History of the AAC

In 1996, the AAC for the Merritt TSA was determined to be 1 454 250 cubic metres; this included a small-diameter pine partition of 250 000 cubic metres. In 1999, the AAC was set at 2 004 250 cubic metres which reflected a two-year uplift of 550 000 cubic metres

per year to address the recovery of fire damaged wood and a mountain pine beetle infestation in portions of the TSA. In 2001, with the removal of the uplift, the AAC was set at 1 508 050 cubic metres; this included a small-diameter pine partition of 312 500 cubic metres. In 2004, the AAC within the TSA was 1 838 750 cubic metres; this reflected a 330 700 cubic metres increase due to an Innovative Forestry Practices Agreement (IFPA). The Minister apportioned the non-IFPA portion of the AAC as follows:

Apportionment	Cubic metres per year	Percentage
Replaceable Forest Licences	1 025 694	68.01
Non-replaceable Forest Licences	212 500	14.09
BC Timber Sales	243 238	16.13
Woodlot Licences	4 200	0.28
Forest Service Reserve	22 468	1.49
Total AAC	**1 508 050**	**100.0**

New AAC determination

Effective July 1, 2005, in response to the need for an emergency forest management strategy for forest health, the new AAC for the Merritt TSA will be 2 814 171 cubic metres. This includes a five-year uplift of 1 000 000 cubic metres to respond to the mountain pine beetle epidemic. A partition of 312 500 cubic metres will continue to be attributable to stands of small-diameter (smallwood) pine. This volume excludes all volumes allocated to woodlot licences. This AAC will remain in effect until a new AAC is determined, which must take place within five years of the present determination. (Please note the possibility of an earlier redetermination, discussed below in 'Determination').

Information sources used in the AAC determination

The Nicola-Similkameen Innovative Forestry Society (NSIFS) hired Timberline Forest Inventory Consultants Ltd to prepare a timber supply analysis in 2003 to support their application for an AAC uplift under their IFPA. Due to the urgency of the mountain pine beetle epidemic in the TSA, this 2003 analysis was used to help support this determination.

Numerous information sources used to support this determination are documented in:

- *Urgent Timber Supply Review for the Merritt Timber Supply Area: Technical Summary for the Allowable Cut Determination Meeting for Section 8 and Section 59.1 Decisions,* Cascades Forest District, May 18-19, 2005. The Cascades Forest District prepared this document with input from the Merritt TSA Uplift Committee consisting of forest licensee, forest district, other agencies and First Nations representatives.

Some key information sources, including the above document, include:

- *NSIFS IFPA Innovative Timber Supply Area Analysis – Final Report* (referred to in rationale as either the "...mber supply analysis", or the "2003 timber supply analysis"), Timberline Forest Inventory Consultants Ltd, April 2003;
- *Urgent timber supply review for the Merritt timber supply area: Public Discussion Paper*, BC Ministry of Forests, April 2005;
- *Rationale for Increase in Allowable Annual Cut (AAC) Determination of Merritt Timber Supply Area Innovative Forestry Practices Agreements, Effective January 1, 2004*, Fred Baxter, Regional Manager, Southern Interior Forest Region, December 2003;
- *Merritt Timber Supply Area Rationale for Allowable Annual Cut (AAC) Determination, Effective January 1, 2002*, Larry Pedersen, Chief Forester, October 2001;
- *Merritt TSA Timber Supply Area Analysis Report*, BC Ministry of Forests, March 2001 ("the 2001 timber supply analysis");
- Letter from the Minister of Forests to the chief forester, dated July 28, 1994, stating the Crown's economic and social objectives for the province (see Appendix 3);
- Memorandum from the Minister of Forests to the chief forester, dated February 26, 1996, stating the Crown's economic and social objectives for the province regarding visual resources (see Appendix 4);
- *Forest and Range Practices Act*, 2002 and amendments;
- *Forest and Range Practices Regulations*, 2004 and amendments;
- *Forest Practices Code of British Columbia Act*, 1995, and amendments;
- *Forest Practices Code of British Columbia Act Regulations*, 1995, and amendments;
- *Forest Practices Code of British Columbia* Guidebooks, BCFS and MELP;
- Technical review and evaluation of current and expected operating conditions through comprehensive discussions with BC Ministry of Forests staff, including the AAC determination meeting held near Merritt on May 18-19, 2005 and a helicopter review of portions of the TSA on May 18, 2005 with district and regional staff.

Role and limitations of the technical information used

Section 8 of the *Forest Act* requires the chief forester, in determining AACs, to consider biophysical, social and economic information. Most of the technical information used in determinations is in the form of a timber supply analysis and its inputs of inventory and growth and yield data. These are concerned primarily with biophysical factors—such as the rate of timber growth and the definition of the land base considered available for timber harvesting—and with management practices.

The computerised analytical models currently used to assess timber supply unavoidably simplify the real world and also involve uncertainty in many of the inputs, due in part to variations in physical, biological and social conditions. While ongoing science-based improvements in the understanding of ecological dynamics will help reduce some of these uncertainties, technical information and analytical methods alone cannot incorporate all the social, cultural and economic factors relevant to forest management decisions, nor do they necessarily provide complete answers or solutions to the forest management

problems addressed in AAC determinations. However, they do provide valuable insight into potential outcomes of different resource-use assumptions and actions—important components of the information that must be considered in AAC determinations.

In determining the AAC for the Merritt TSA I have considered and discussed known limitations of the technical information provided, and I am satisfied that the information provides a suitable basis for my determination.

Statutory framework

Section 8 of the *Forest Act* requires the chief forester to consider a number of specified factors in determining AACs for timber supply areas and tree farm licences. Section 8 is reproduced in full as Appendix 1 of this document.

Guiding principles for AAC determinations

Rapid changes in social values and in the understanding and management of complex forest ecosystems mean there is always uncertainty in the information used in AAC determinations. In making the large number of periodic determinations required for British Columbia's many forest management units, administrative fairness requires a reasonable degree of consistency of approach in incorporating these changes and uncertainties. To make my approach in these matters explicit, I have set out the following body of guiding principles. In any specific circumstance where I may consider it necessary to deviate from these principles, I will explain my reasoning in detail.

Two important ways of dealing with uncertainty are

(i) minimizing risk, in respect of which in making AAC determinations I consider particular uncertainties associated with the information before me and attempt to assess and address the various potential current and future, social, economic and environmental risks associated with a range of possible AACs; and

(ii) redetermining AACs frequently, in cases where projections of short-term timber supply are not stable, to ensure they incorporate current information and knowledge—a principle that has been recognized in the legislated requirement to redetermine these AACs every five years. This principle is central to many of the guiding principles that follow.

In considering the various factors that Section 8 of the *Forest Act* requires the chief forester to take into account in determining AACs I attempt to reflect, as closely as possible, operability and forest management factors that are a reasonable extrapolation from current practices. It is not appropriate to base my decision on unsupported speculation with respect to factors that could work to *increase* the timber supply—such as optimistic assumptions about harvesting in unconventional areas, or using unconventional technology, that are not substantiated by demonstrated performance—or with respect to factors that could work to *reduce* the timber supply, such as integrated resource management objectives beyond those articulated in current planning guidelines or the Forest Practices Code—'the Code'—which is now in transition to the Province's *Forest and Range Practices Act*.

In many areas the timber supply implications of some legislative provisions, such as those for landscape-level biodiversity, remain uncertain, particularly when considered in combination with other factors. In each AAC determination I take this uncertainty into account to the extent possible in context of the best available information.

As British Columbia progresses toward the completion of strategic land-use plans, in some cases the eventual timber supply impacts associated with land-use decisions resulting from various regional and sub-regional planning processes remain subject to some uncertainty before formal approval by government. It is my practice not to speculate on timber supply impacts that may eventually result from land-use decisions not yet finalized by government.

In some cases, even when government has made a formal land-use decision, it is not necessarily possible to fully analyze and account for the consequent timber supply impacts in a current AAC determination. Many government land-use decisions must be followed by detailed implementation decisions requiring for instance the establishment of resource management zones and resource management objectives and strategies for those zones. Until such implementation decisions are made it would be impossible to fully assess the overall impacts of the land-use decision. In such cases the legislated requirement for frequent AAC reviews will ensure that future determinations address ongoing plan-implementation decisions. Wherever specific protected areas have been designated by legislation or by order in council, these areas are deducted from the timber harvesting land base and are not considered to contribute any harvestable volume to the timber supply in AAC determinations, although they may contribute indirectly by providing forest cover to help in meeting resource management objectives such as for biodiversity.

Where appropriate, I will consider information on the types and extent of planned and implemented silviculture practices as well as relevant scientific, empirical and analytical evidence on the likely magnitude and timing of their timber supply effects.

Some have suggested that, given the large uncertainties present with respect to much of the data in AAC determinations, any adjustments in AAC should wait until better data are available. I agree that some data are not complete, but this will always be true where information is constantly evolving and management issues are changing. Moreover, in the past, waiting for improved data created the extensive delays that resulted in the urgency to redetermine many outdated AACs between 1992 and 1996. In any case, the data and models available today are superior to those available in the past, and will undoubtedly provide for more reliable determinations.

Others have suggested that, in view of data uncertainties, I should immediately reduce some AACs in the interest of caution. However, any AAC determination I make must be the result of applying my judgement to the available information, taking any uncertainties into account. Given the large impacts that AAC determinations can have on communities, no responsible AAC determination can be made solely on the basis of a response to uncertainty. Nevertheless, in making my determination, I may need to make allowances for risks that arise because of uncertainty.

With respect to First Nations' issues, I am aware of the Crown's legal obligations resulting from decisions in recent years in the Supreme Court of Canada. The AAC that I determine should not be construed as limiting the Crown's obligations under these decisions in any way, and in this respect it should be noted that my determination does not prescribe a particular plan of harvesting activity within the Merritt TSA. It is also independent of any decision by the Minister of Forests and Range with respect to subsequent allocation of the wood supply. I consider those aboriginal interests raised during the consultation process associated with timber supply review. As I am able, within the scope of my authority under section 8 of the *Forest Act,* I address those interests. When aboriginal interests are raised that are outside of my jurisdiction, I will endeavour to forward these interests for consideration to other decision-makers.

Overall, in making AAC determinations, I am mindful of my obligation as steward of the forest land of British Columbia, of the mandate of the Ministry of Forests and Range as set out in Section 4 of the *Ministry of Forests Act*, and of my responsibilities under the Code and under the *Forest and Range Practices Act*.

Because the new regulations of the *Forest and Range Practices Act* are designed to maintain the integrity of British Columbia's forest stewardship under responsible forest practices, it is not expected that the implementation of the legislative changes will significantly affect current timber supply projections made using the Code as a basis for definition of current practice.

The role of the base case

In considering the factors required under Section 8 of the *Forest Act* to be addressed in AAC determinations, I am assisted by timber supply forecasts provided to me through the work of the Timber Supply Review program for TSAs and TFLs.

For each AAC determination for a TSA a timber supply analysis is carried out using an information package including data and information from three categories—land base inventory, timber growth and yield, and management practices. Using this set of data and a computer simulation model, Timberline's Critical Analysis of Schedules for Harvesting (CASH6) for the Merritt TSA, a series of timber supply forecasts can be produced, reflecting different decline rates, starting harvest levels, and potential trade-offs between short- and long-term harvest levels.

From a range of possible forecasts, one is chosen in which an attempt is made to avoid both excessive changes from decade to decade and significant timber shortages in the future, while ensuring the long-term productivity of forestlands. This is known as the 'base case' forecast, and forms the basis for comparison when assessing the effects of uncertainty on timber supply. The base case is designed to reflect current management practices. The base case forecast for this timber supply review is called the "IFPA/expedited base" (or Scenario K) in the 2003 timber supply analysis.

Because it represents only one in a number of theoretical forecasts, and because it incorporates information about which there may be some uncertainty, the base case forecast for a TSA is not an AAC recommendation. Rather, it is one possible forecast of

timber supply, whose validity—as with all the other forecasts provided—depends on the validity of the data and assumptions incorporated into the computer simulation used to generate it.

Therefore, much of what follows in the considerations outlined below is an examination of the degree to which all the assumptions made in generating the base case forecast are realistic and current, and the degree to which any adjustments to its predictions of timber supply must be made, if necessary, to more properly reflect the current situation.

Such adjustments are made on the basis of informed judgement using current available information about forest management that may well have changed since the original information package was assembled. Forest management data is parti ularly subject to change during periods of legislative or regulatory change, or during the implementation of new policies, procedures, guidelines or plans. Thus it is important to remember that while the timber supply analysis with which I am provided is integral to the considerations leading to the AAC determination, the AAC is not determined by calculation but by a synthesis of judgement and analysis in which numerous risks and uncertainties must be weighed. Depending upon the outcome of these considerations, the resulting AAC may or may not coincide with the base case forecast. Moreover, because some of the risks and uncertainties considered are qualitative in nature, once an AAC has been determined, further computer analysis of the combined considerations may not confirm or add precision to the AAC.

Base case for the Merritt TSA

The base case in 2003 timber supply analysis that is used in this timber supply review incorporates a number of changes in input data and methodology from the base case generated in the 2001 timber supply analysis that supported the previous AAC determination effective January 1, 2002. These differences include the use of:

- Phase 2 Vegetation Resource Inventory;
- Predictive Ecosystem Mapping (PEM);
- revised site productivity estimates;
- updated silvicultural regimes and genetic gain assumptions for regenerated managed stands;
- new deer winter range mapping and management objectives; and
- revised landscape level management assumptions for old forest retention.

Due to these and other changes, the current and previous base case projections are not directly comparable in some respects. Comprehensive details of the assumptions made in representing current forest management in the Merritt TSA in the base case are provided in the 2003 timber supply analysis report and many are also discussed in relevant sections of this rationale.

In the base case, the harvest flow objectives included maintaining a relatively high initial harvest level for as many decades as possible with a gradual, controlled decline in harvest levels if required to reflect forest management assumptions. The objectives also included achieving a maximum even-flow long-term supply where the growing stock is stable.

The resulting base case forecast indicates that the initial harvest level of 1 994 671 cubic metres can be maintained for 40 years. After that, harvest levels decline by approximately 10% per decade for two decades before reaching the long-term harvest level of 1 660 000 cubic metres per year.

From my review of the timber supply analysis, including detailed discussions with BCFS analysts, I see no reason why the base case forecast should not provide a suitable basis of reference for use in my considerations in this determination. In addition to the base case forecast, I was provided with a number of sensitivity analyses carried out using the base case as a reference. All of these analyses, and others as noted below, have been helpful in the considerations and reasoning leading to my determination, which are documented as follows.

Consideration of Factors as Required by Section 8 of the *Forest Act*

Section 8 (8)

In determining an allowable annual cut under this section the chief forester, despite anything to the contrary in an agreement listed in section 12, must consider

(a) the rate of timber production that may be sustained on the area, taking into account

(i) the composition of the forest and its expected rate of growth on the area

Land base contributing to timber harvest

- general comments

The total area of the Merritt TSA is estimated to be 1 130 064 hectares with a total Crown-owned area (including freshwater) of 920 607 hectares. Of the Crown area, approximately 99 210 hectares are considered non-forest or non-productive and non-commercial forest, and 10 984 hectares are in parks and ecological reserves. The Crown productive forestland base is therefore estimated to be 810 412 hectares (about 71% of total TSA area).

About 132 162 hectares (16%) of the Crown productive forestland base was assumed to be unavailable for timber harvesting in the timber supply analysis. The main reasons that forests are unavailable is because they are considered environmentally sensitive, occur on potentially unstable terrain, include problem forest types, are needed to be retained to address riparian management, and due to roads, trails and landings. The current area estimated to be economically and environmentally suitable for harvesting—the 'timber harvesting land base'—covers 678 250 hectares (84% of the Crown productive forests).

The long-term timber harvesting land base is assumed in the timber supply analysis to decrease in the future by 41 441 hectares to 636 809 hectares to account for future roads, trails and landings, and a small area converted to grasslands.

A sensitivity analysis was conducted that increased and decreased the timber harvesting land base by 10%. These changes had a corresponding 10 to 11% impact on short- and

mid-term harvest levels. I am mindful therefore of the importance of appropriately accounting for the timber harvesting land base in my determination.

Deriving the timber harvesting land base includes making a series of deductions from the productive forest land base to account for factors that effectively reduce the suitability or availability of the productive forest area for economic or ecological reasons. In timber supply analysis, assumptions, and if necessary, projections, must be made about these factors, prior to quantifying appropriate areas to be deducted from the productive forest area to derive the timber harvesting land base. A detailed accounting of the areas deducted is given in the 2003 timber supply analysis. My consideration of these deductions follows. Relatively small deductions to the land base to account for water intake facilities and existing wildlife habitat areas are discussed later in *community watersheds* and *identified wildlife* respectively.

- inoperable areas and unstable terrain

Those portions of the TSA which are not physically accessible for harvesting, or which are not feasible to harvest economically, are excluded in deriving the timber harvesting land base. BCFS district staff delineated operability lines for the Merritt TSA in 1991; revised lines based on a review by Forest Service and forest industry staff was used in the timber supply analysis to identify inoperable areas.

Terrain stability mapping completed for areas with some of the most difficult terrain that cover about 15% of the TSA were used in the analysis; all class 5 terrain, the potentially most unstable areas, were excluded from the timber harvesting land base. For other portions of the TSA, areas with slopes greater than 65% were excluded from the timber harvesting land base.

More recent terrain stability mapping for an additional 10% of the TSA was not used in the analysis. The effect of using the mapping instead of the default 65% slope criterion was not assessed but is not believed by district staff to have a significant affect on the timber harvesting land used in the analysis.

The timber supply analysis excluded 38 308 hectares from the timber harvesting land base to account for inoperable areas and unstable terrain. District staff believe the analysis provides a reasonable approximation of current information with respect to this factor. Although I concur that on balance these considerations have been reasonably accounted for in the timber supply analysis, I do comment on a potential issue with environmental sensitive areas that I discuss below.

- environmentally sensitive areas

An environmentally sensitive area (ESA) is an area where non-timber values or potential management-related hazards may preclude or limit timber harvesting. The forest inventory identifies ESAs for factors such as unstable soils, impediments to regeneration, high risks of avalanches, wildlife habitat and recreation. The inventory maps both highly sensitive (ESA 1) and moderately sensitive (ESA 2) areas. In the timber supply analysis, ESA 1s were fully excluded from the timber harvesting land base while ESA 2s were not excluded. A total of 34 673 hectares were excluded from the timber harvesting land base because of ESA 1s.

Approximately 33% of ESA 2s overlap with ESA 1s; consequently not all ESA 2s are in the timber harvesting land base. BCFS district staff have observed harvesting performance in some ESA 2s and believe that special harvesting practices can occur in other ESA 2s in a manner that addresses the sensitive values in the area. Nevertheless there is some uncertainty with respect to the level of contribution of ESA 2s to timber supply.

Where terrain stability mapping exists (as discussed above), unstable terrain was deducted for both Class 5 terrain and ESA 1s. This may have led to an overestimate of timber supply impacts if older ESA 1s mapping for soils did not overlap with Class 5 terrain based on updated mapping. In many other TSAs and TFLs, terrain stability mapping is used where it exists instead of older ESA mapping for unstable soils. I encourage the completion of terrain stability mapping in the TSA, subject to available resources, so that this updated information can used to account for unstable terrain in subsequent timber supply analyses.

Notwithstanding these concerns, on balance I find that the land base deductions used in the timber supply analysis has reasonably accounted for ESAs for the purposes of this determination.

- problem forest types

Problem forest types are not expected to be economically utilizable due to low volumes or poor quality. The base case excluded coniferous-leading stands based on factors such as site index; the criteria employed are more fully described in the timber supply analysis. All deciduous-leading stands, and all deciduous volumes in coniferous-leading stands, were also excluded in the analysis. There has been little interest expressed in harvesting deciduous species in part because of their limited availability in the Merritt TSA.

BCFS district staff believe the assumptions used in the timber supply analysis have satisfactorily modelled current practices in the TSA. I am satisfied therefore that this factor has been adequately accounted for in the base case for the purposes of this determination.

Other challenging forest types include *smallwood pine* and dry-belt Douglas-fir (see *single tree selection*) which I address and account for later in this document.

- riparian management

Riparian areas along streams, lakes and wetlands provide key habitat for fish and wildlife and help conserve water quality and biodiversity. The Forest Practices Code (Code) and the *Forest and Range Practices Act* (FRPA) provide for riparian reserve zones (RRZs) that exclude timber harvesting and riparian management zones (RMZs) that restrict timber harvesting in order to protect riparian habitats.

In 2001, the NSIFS developed a stream classification model based on topographic mapping and Forest Practices Code riparian classifications. In the timber supply analysis, all modelled riparian reserve zones and 50% of riparian management zones were excluded from the timber harvesting land base. The base case deducted 23 927 hectares from the land base to account for riparian management areas. A 2001 report entitled *Local Watershed Expert Model for the Merritt TSA* confirmed the accuracy of the model for the purposes of timber supply analysis. Ministry of Sustainable Resource Management (MSRM) staff noted that the model may be appropriate at the strategic level for timber supply review, but is not acceptable for operational use.

In 2000, the district manager and designated environment official jointly made known a number of fish-bearing streams within the Nicola watershed as temperature sensitive streams. The timber supply analysis did not model the full management requirements for these temperature sensitive streams. The impact was considered in the previous AAC determination to be about 1000 hectares (0.15%) of the timber harvesting land base.

An assessment by NSIFS for about 75% of the area covered by temperature sensitive streams concluded that riparian management guidelines for S1-S4 streams adequately addresses temperature sensitive streams, but additional retention would be required on direct tributaries to these streams. Their assessment indicated an additional 440 to 550 hectares would need to be reserved; however their assessed area, as discussed, does not cover all temperature sensitive streams.

District staff conclude that riparian management areas, as modelled in the timber supply analysis, represents the best available information; however they believe the analysis has not fully accounted for the timber supply impacts associated with temperature sensitive streams. I concur that, except for temperature sensitive streams, the analysis has appropriately accounted for riparian management. However, there is a slight downward pressure on timber supply, relative to the base case, due to assumptions regarding temperature sensitive streams. I have accounted for a 1000 hectare (0.15%) downward pressure on timber supply in my "Reasons for Decision" which equates to an approximate 3000 cubic metres per year impact on timber supply over the full forecast horizon.

- archaeological and cultural heritage resources

Archaeological and cultural heritage resources include archaeological sites and traditional uses of the land by First Nations. To assist in identifying these resources, archaeological inventory studies, archaeological impact assessments and traditional use studies have been undertaken in the Merritt TSA. Over 500 archaeological sites protected under the *Heritage Conservation Act* have been identified in the TSA. The majority of these sites

are either located outside of the Crown productive forest land base or are in areas deducted from the timber harvesting land base for other reasons such as riparian management. The timber supply analysis modelled a no-harvest buffer around remaining archaeological sites, typically a 50-metre radius around site, in order to account for these values. This resulted in about 50-hectares of additional deductions to the timber harvesting land base.

Other projects undertaken by First Nations and the NSIFS in the TSA can improve the information about cultural heritage resources. The district has good relationships with First Nations groups and commonly has First Nations representation at TSA planning initiatives. The district works jointly with First Nations in order to get a better understanding of their interests, including cultural heritage resources, and to aid the operational planning and approval process.

About one-half of the TSA has a completed traditional use study; several First Nation bands have expressed the need for funding and resources to complete these studies for the remainder of the TSA in order to provide more meaningful input into operational planning processes prior to harvest. First Nations comments have also expressed concern that operational forest management activities including increased harvesting of mountain pine beetle infested stands could affect cultural heritage values such as their use of botanical forest products. Other interests and concerns raised by First Nations that are not directly related to cultural heritage values are addressed in *First Nations considerations*.

District staff believe that archaeological sites were reasonably modelled in the timber supply analysis. As additional studies and assessments are completed, more sites are expected to be found and forest practices may need to be modified to address cultural heritage resources. For the purposes of this determination, I am satisfied that the base case has adequately accounted for archaeological and cultural heritage resources as reflected in current management practices using the best available information.

I am also mindful that improved information may result in revisions to future practices relative to those modelled in the analysis. When funding is available, I encourage completion of traditional use studies in the TSA so that this information can be factored into future timber supply analyses. Future determinations can account for any changes in forest practices that are needed to address cultural heritage resources.

With respect to First Nations comments about effects of operational forest management activities, BCFS staff informed me about some of the operational approaches used in the TSA by forest licensees to account for First Nations interests including cultural heritage resources and effects on botanical forest products. Forest licensees have set agreements with First Nations technical staff who review proposed forest development planning, perform preliminary field reconnaissance (if required), in efforts to ensure that First Nations traditional use interests are addressed. This process becomes an important consideration before the district manager considers plan approval. It is expected that this process would continue should harvest levels increase to address the mountain pine beetle epidemic. This operational approach should help address concerns about the impacts of harvesting on traditional uses including botanical forest products.

- heritage trails

Heritage trails are designated under the *Heritage Conservation Act*. Portions of four heritage trails (Hope Pass, Dewdney, Whatcom and Hudson Bay Company trails) totalling about 30 kilometre in length exist in the Merritt TSA. The trails are protected via a 200-metre right-of-way where a permit is required before any alterations occur. The right-of-way was deducted from the timber harvesting land base for the purposes of the timber supply analysis, resulting in 495 hectares of Crown productive forest area being deducted from the land base. I am satisfied that that the timber supply analysis has appropriately accounted for heritage trails for the purposes of this determination.

- roads, trails and landings

In the analysis, separate estimates were made to reflect reductions to the timber harvesting land base already incurred by existing roads trails and landings, and those to be expected in the future. The estimates used in the analysis are based on a district study following methods developed by the regional soil scientist and district staff. Existing roads, trails and landings in young stands 40 years of age or younger were estimated to represent a 9.3% loss in the timber harvesting land base, whereas existing roads in older stands greater than 40 years of age were estimated to represent a 0.4% loss in the land base. Future roads, trails and landings were estimated to represent an additional 6.9% loss in the land base in order to account for future harvesting activity. The resulting reductions were 11 851 hectares for existing and 40 407 hectares for future roads, trails and landings.

Estimated losses in the timber harvesting land base to account for roads, trails and landings modelled in the timber supply analysis used the best available information and I accept their use for this determination as a reasonable accounting of this factor.

- grassland conversion

Some grassland ecosystems in the Merritt TSA have been encroached by Douglas-fir and ponderosa pine forests. BCFS staff believe that about 1034 hectares of the current timber harvesting land base are more appropriately managed as grassland after harvesting. The timber supply analysis reflected this approach and reduced the future timber harvesting land base to account for conversion of forests back to grasslands. Legal or policy direction may be needed before licensees are able to harvest the areas and be relieved of their free-growing obligations and further work on this issue is required. In the meantime, I am satisfied the need to restore over time current forest encroachment areas back to grasslands has been appropriately modelled in the base case. Any uncertainty in this factor represents a very low risk since only about 0.2% of the future timber harvesting land base is at issue, therefore there is no expected impact on short-term timber supply.

- woodlot licences

The *Forest Act* requires AACs determined for TSAs to be exclusive of the areas and timber volumes allocated to woodlot licences. When woodlot licences are issued from a TSA, the required volumes are first allocated from an appropriate apportionment under the AAC for the TSA. Then, in the next AAC determination for the TSA, the TSA land

base is reduced by the area of Crown land in all the woodlot licences issued since the previous determination, and the total volume in the issued woodlot licences is excluded from contributing to the AAC for the TSA.

The existing woodlots in the TSA area are not included in timber harvesting land base and do not contribute in the analysis to meeting forest cover requirements. About eight woodlots in the TSA area are eligible to have their existing areas increased. Several approval considerations need to be applied so some of these woodlots may not be increased. If they were all approved, district staff estimate 1600 hectares (about 0.2% of the current timber harvesting land base) could be withdrawn from the TSA.

I am satisfied that the timber supply analysis addressed woodlots appropriately since existing licences were not part of the base case while potential woodlot additions were included. For this determination, in keeping with my guiding principles, I will not speculate on allocation decisions that have not yet been made. Once the amount of area being added to woodlots is approved it can be accounted for in the next determination. At any rate, the proposed woodlot additions do not represent a significant pressure on timber supply based on the information provided.

- protected areas strategy

The timber supply analysis deducted 10 984 hectares of existing parks and ecological reserves from the Crown productive forest land base.

As part of the province's protected areas strategy (PAS), a number of areas of interest and approved study areas have been identified. These areas total 60 211 hectares within the TSA of which 31 607 hectares are in the timber harvesting land base. Since no Land and Resource Management Planning (LRMP) process is underway in the Merritt TSA, there are no current plans to designate some or all of these PAS areas as parks or ecological reserves. These areas were not excluded from the timber harvesting land base in the analysis. Forest management activities within these areas are in general accordance with draft regional PAS interim development guidelines prepared in 1994. These guidelines allow the management of pests and salvage and mountain pine beetle harvesting has occurred in some PAS areas. The deployment of draft old growth management areas and wildlife tree patches cover some of these PAS areas.

Comments from the Sierra Club requested that a land use planning process be implemented in the TSA and that all candidate protected areas be placed under an immediate moratorium. I discuss this issue later in *land and resource management planning*.

In keeping with my guiding principles, I will not speculate on land use decisions (such as protected areas) that have not yet been made. Therefore, for the purposes of this determination, it would be inappropriate for me to assume PAS areas of interest or study areas do not contribute to the TSA's timber supply. When protected area decisions are made, these can be reflected in subsequent determinations. For the purposes of this determination, I am satisfied that the timber supply analysis appropriately accounted for this factor.

I do note, as discussed, that the values in some of these PAS areas are being conserved through draft old growth management areas, wildlife tree patches, and likely also through other non-timber provisions which I have accounted for in my determination.

- TSA boundary

Mapping of the Merritt TSA boundary was refined since the timber supply analysis was prepared in 2003 and the TSA is now estimated to be 901 hectares larger than assumed in the base case. Although the composition of this additional area is unknown, BCFS district staff believe that the area is likely to be high-elevation boundary areas outside the timber harvesting land base. I am satisfied therefore that no adjustment for this relatively small area is needed for the purposes of this determination.

- smallwood pine

A smallwood pine partition was established with an AAC of 312 500 cubic metres in the last determination (also see *utilization standards*). The partition applies to areas with a site index of 14 or less. The timber supply analysis assumed these areas contributed to the timber harvesting land base. Non-replaceable forest licensees are successfully harvesting this volume. Regenerated managed stands following harvest have a much higher site index and are not likely to pose a small diameter problem in the future.

BCFS district staff believe the TSA needs to be re-inventoried so that opportunities for new non-replaceable forest licenses in smallwood partition areas can be better determined. This will be particularly needed before existing licenses expire in about 6 years. I encourage the regional executive director to work with Forest Analysis Branch so that this need can be identified to the appropriate ministry for consideration.

For the purposes of this determination, I am confident, based on recent harvest history, that smallwood pine stands are contributing to the timber harvesting land base as assumed in the timber supply analysis.

Existing forest inventory

The forest inventory used in the timber supply analysis was completed between 1991 and 1996, and updated to 1999 for harvesting and natural disturbances. In 1997, a MOF inventory audit indicated that the mature inventory volumes were underestimated by 6% but that this result was not statistically significant.

Vegetation Resource Inventory (VRI) generally consists of two phases: phase 1 based on photo interpretation, and phase 2 consisting of ground sampling. The NSIFS completed VRI phase 2 work in 1999/2000. The intent of this ground sampling was to increase confidence in the forest inventory including volume estimates, improve understanding of Douglas-fir forest types and high elevation spruce forests.

The VRI analysis by NSIFS based on phase 2 work concluded that inventory volumes were underestimated by 6%. Although this was not statistically significant, the findings were similar to those from the previous inventory audit. The phase 2 study also noted

that inventory volumes would be underestimated by 9% if volume adjustment ratios were stratified by species groups. The study also noted that the underestimate would be slightly higher than 6% if adjustments were just made using the subset of sample plots that are in the timber harvesting land base.

The timber supply analysis used natural stand yield tables developed using the BCFS Variable Density Yield Prediction (VDYP version 6.6d). To reduce the number of yield tables, analysis units were developed based on stand characteristics rather than using individual stands.

The timber supply analysis increased natural stand yield tables by 6% based on the phase 2 study and this is reflected in the base case. MSRM staff reviewed the phase 2 sampling and agrees that the data suggests inventory volumes are underestimate by at least 6%.

MSRM recommends use of a standard procedure (called the Fraser Protocol) to adjust the forest inventory based on phase 2 ground samples. The NSIFS found that using the procedure in the Merritt TSA yielded results that did not confirm the phase 2 findings and therefore did not use the procedure in the timber supply analysis.

In reviewing this factor, I note that both the MOF inventory audit in 1997 and the VRI phase 2 work in 1999/2000 suggest inventory volumes were underestimated by 6%. I am therefore satisfied that the timber supply analysis appropriately accounted for this factor by increasing volume estimates in the forest inventory by 6%. The problems encountered using the standard procedure (the Fraser Protocol) for adjusting inventory attributes based on the phase 2 ground samples needs to be reconciled and I identify this concern under "Implementation".

Expected rate of growth

- site productivity estimates

Inventory data include estimates of site productivity for each forest stand, expressed in terms of a site index. The site index is based on the stand's height as a function of its age. The productivity of a site largely determines how quickly trees grow. This in turn affects the time seedlings will take to reach green-up conditions, the volume of timber that can be produced, and the ages at which a stand will satisfy mature forest cover requirements and reach a merchantable size.

The most accurate estimates of site productivity come from stands between 30 and 150 years of age. The growth history of stands less than 30 years of age is often not long enough to give accurate measurements of site productivity. Estimates derived from older stands underestimates site productivity as these stands are often well past the age of maximum height growth and have often been affected by disease, insects and top damage as they reach advanced age. The underestimate of site productivity based on forest inventory estimates for older stands have been verified in several studies (e.g. Old-Growth Site Index or OGSI study) in the province. These studies have confirmed that when old stands are harvested and regenerated, site productivity realized is generally higher than inventory-based site index estimates of older stands would predict.

In the timber supply analysis for the Merritt TSA, site productivity estimates were based on a NSIFS project in three forest strata: low-elevation even-aged stands, high-elevation even-aged stands, and small diameter (smallwood) pine stands. Encouragement to undertake this project was provided by the chief forester in the last determination.

For low-elevation even-aged stands, NSIFS developed preliminary site index estimates for unique ecosystem combinations (using predictive ecosystem mapping polygons, soil, drainage and elevation class) based on existing site productivity data, field experience and expert opinion. The results from statistically based field samples collected in 1999/2000 were used to adjust the site index estimates and these revised estimates were used in the timber supply analysis. A 2003 study that reviewed the results of the project identified sources of uncertainty but also concluded that the adjusted estimates should provide reasonable results with minimal bias. The adjustments based on this project significantly increases site productivity estimates relative to estimates based on the existing forest inventory. Use of the revised estimates in turn increases forecasted timber supply availability by 420 000 cubic metres per year for first 5 decades, 582 000 cubic metres per year for decades 6 to 10, and by 662 000 cubic metres per year in long term. The NSIFS proposed an IFPA-related AAC increase based on these forecasted increases in timber supply. In 2004, the regional manager reduced the proposed IFPA AAC increase by 21 000 cubic metres (about 5%) to account for uncertainties in the estimates used in the timber supply analysis in the short term. NSIFS recently submitted a monitoring plan that was requested by the regional manager in order to reduce uncertainty and risk in this factor.

For high-elevation even-aged stands, site productivity was estimated using a model developed outside the TSA for high elevation Englemann Spruce-Subalpine Fir (ESSF) stands but modified for the Merritt TSA. The modelled site productivity estimates were assigned unique ecosystem combinations (as previously described for low-elevation stands). The estimates are not based on statistically-based field samples. The modelled site productivity estimates used in the timber supply analysis, relative to forest inventory-based estimates used in the 2001 timber supply analysis, did not result in increased harvest flow.

Existing unmanaged small-diameter pine stands are believed to grow in repressed conditions (with a site index of 14 or less) where site productivity estimates should increase substantially based on future managed stands. However, obtaining reliable estimates of the productivity of regenerated stands is difficult given the limited recent harvesting of these stands. The BCFS sampled some of these managed regenerated stands in 2000 and found an average site index of 18.8 metres but concluded that further study was needed to substantiate this estimate. A limited review of 12 post-harvest cutblocks in 2001 by NSFIS supported the 18.8 metre estimate. In 2002, an NSFIS study estimated site index using three approaches; the estimated average site index ranged from 16.8, 18.4 and 18.7 for small-diameter stands based on this study. The timber supply analysis used the 18.4 estimate that was based on the relative site index adjustments made for low-elevation stands. If the timber supply impact of these site index adjustments were distributed evenly across the harvest flow horizon, there would be 90 000 cubic metres per year gain in available timber relative to estimates based on the forest inventory. The

NSIFS proposes IFPA-related AAC increase assumed these increased volumes. Recognizing the considerable uncertainty in these estimates, the regional manager in 2004 reduced the requested IFPA-related AAC increase by 80 000 cubic metres per year (about 90%). BCFS staff note the difficulty in determining reliable growth and yield information for these managed stands given the limited harvest history as well as the fact that sampled post-harvest cutblocks are often too young (less than 30 years) to provide accurate estimates of site index.

Although I am satisfied that the statistically-based ground sampling that supported the adjusted site productivity estimates for low-elevation uneven-aged stands used in the timber supply analysis represents the best available information, I also recognize uncertainty and risk associated with these estimates. I concur with the 21 000 cubic metres downward pressure in timber supply recognized in 2004 by the regional manager and note that results from the monitoring plan should reduce uncertainty in this factor before the next determination. I also agree with the 80 000 cubic metres downward pressure in timber supply recognized by the regional executive director relative to the base case to account for the small-diameter pine site productivity estimates used in the analysis. Some gain in timber volume is highly likely in these stands however the magnitude of this gain is subject to considerable uncertainty given the challenge to find suitable areas to sample. Although the adjusted estimates for high elevation stands used in the analysis have high uncertainty, they represent no change in predicted timber supply availability relative to estimates based on the forest inventory; therefore there is no need to make adjustments for these stands. In summary, I have accounted for the two noted downward pressures in timber supply in my "Reasons for Decision".

- operational adjustment factors

In the analysis, the standard BCFS growth and yield model Table Interpolation Program for Stand Yields or TIPSY was used to estimate the timber volumes for regenerated managed stands. The TIPSY projections are initially based on ideal conditions, assuming full site occupancy and the absence of pests, diseases and significant brush competition. However, certain operational conditions, such as a less-than-ideal distribution of trees, the presence of small non-productive areas, endemic pests and diseases, or age-dependent factors such as decay, waste and breakage, may cause yields to be reduced over time. Two operational adjustment factors (OAFs) are therefore applied to yields generated using TIPSY, to account for losses of timber volume resulting from these operational conditions. OAF 1 is designed to account for factors affecting the yield curve across all ages, such as small stand openings. OAF 2 accounts for factors whose impacts tend to increase over time such as pests, disease, decay, waste and breakage. In the Merritt TSA timber supply analysis, the standard provincial modelling reductions of 15% for OAF1 and 5% for OAF2 were applied.

The use of standard OAF reductions is considered to be the best available information by BCFS district staff and I accept their use as reasonable for the purposes of this determination.

- single tree selection

Dry-belt Douglas-fir stands are managed under an uneven-aged selection silvicultural system and were identified as a single tree selection stratum in the timber supply analysis. Many of these stands have a history of partial harvesting or partial disturbance, and consequently have highly variable volumes. These stands are currently not a priority for harvesting given the need to address lodgepole pine stands vulnerable to the mountain pine beetle epidemic.

Unique yield tables were developed for the timber supply analysis using 'SINGROW' – a volume increment model that used results from BCFS's Prognosis model together with permanent sample plots from the Merritt TSA dry-belt fir stands. These unique tables using CASH6 were compared with yield table assumptions used in the 2001 timber supply analysis using VDYP and FSSIM. The implementation of the tables and harvesting regime in CASH6 resulted in no change in short-term timber supply but resulted in a decrease in available timber volume in the mid- to long-term.

Although the unique yield tables developed for the timber supply analysis represent the best available information, there has been relatively little peer review or validation of the model. The chief forester in the last determination encouraged staff to monitor dry-belt fir stands so that their level of contribution to timber supply can be more accurately assessed. This effort continues to be needed.

In the meantime, I accept the base case assumptions for this factor for the purposes of this determination.

- genetic worth

Use of select seed with improved genetic traits can increase timber volumes of managed stands in the long term and quicken the time for a stand to reach a green-up height or reach minimum harvestable age, thereby also having an influence on short- and mid-term timber supply. The quantity and quality (genetic worth) of select seed has increased in the past decade, and is projected to increase further, throughout the province including the Merritt TSA.

In the timber supply analysis, the volume gains expected at harvest age from the use of select seed were accounted for in future managed stand yield tables; no gains were assumed for existing stands less than 25 years of age. The net average genetic gain ranged from 0.9% to 1.2% for lodgepole pine, and 3.2% for spruce. The estimated gains used in the timber supply analysis are considered somewhat conservative relative to projected slightly higher estimates from BCFS Tree Improvement Branch.

In reviewing the information with BCFS district staff, I conclude that the base case reasonably reflects the use of select seed in the TSA for the purposes of this determination.

- minimum harvestable ages

A minimum harvestable age is an estimate of the earliest age at which a forest stand has grown to a harvestable condition. The minimum harvestable age assumption mainly affects when second growth stands will be available for harvest within the timber supply model. This, in turn, affects how quickly existing stands may be harvested such that a stable flow of timber harvest may be maintained. In practice, many forest stands will be harvested at much older ages than the minimum harvestable age, due to economic considerations or forest cover constraints on harvesting that arise from managing for such values as visual quality, wildlife and water quality.

The timber supply analysis assumed that minimum harvestable ages for all managed and unmanaged stands was the age in which 90% of the culmination of mean annual increment is achieved. A sensitivity analysis that increased minimum harvest ages by 10% reduced short-term timber supply by about 5% while increasing timber supply in the long term. Reducing minimum harvest ages by 10% had no effect on short-term timber supply.

After discussing this factor with BCFS staff, I accept the approach taken in the analysis as appropriate for use in this determination.

(ii) the expected time that it will take the forest to become re-established on the area following denudation:

Regeneration delay and impediments to prompt regeneration

Regeneration delay is the period between harvesting and the time at which an area becomes occupied by a specified minimum number of acceptable, well-spaced seedlings. In the timber supply analysis, an average regeneration delay of 3.4 years was assumed. This assumption was based on licensee questionnaire about forest management practices from 1997 to 2000.

Although there are no significant impediments to reforestation, the main impediments in the Merritt TSA are cattle damage, high water tables, brush competition and drought. Recent plantations are being monitored and assessed. BCFS district staff do not believe these impediments are affecting managed stand yields beyond the factors already accounted for in the analysis.

In reviewing the information presented to me, I am satisfied that the analysis adequately reflects current practice in its treatment of this factor.

Not-satisfactorily-restocked areas

Not-satisfactorily-restocked (NSR) areas are those where timber has been removed, either by harvesting or by natural causes, and a stand of suitable forest species and stocking has yet to be established. Areas where the standard regeneration delay has not yet elapsed since harvesting are considered 'current' NSR and fluctuate with the amount of disturbance (e.g. harvesting, fires) currently taking place. Since 1987 there is a legal

obligation to reforest harvested areas. Where a site was harvested prior to 1987 and a suitable stand has not yet been regenerated, a classification of 'backlog' NSR is applied.

In the Merritt TSA, the total area of current NSR reflects recent harvesting that has not yet been planted or otherwise reforested but is fully expected to be restocked in the near term. The timber supply analysis assumed no backlog NSR.

Recent fires have burned some stands in the timber harvesting land base. The total area is not known but very generally estimated to be around 500 hectares. *Forests for Tomorrow* is a potential funding source to survey and treat these areas. Although I acknowledge that NSR due to the fires may be slightly higher than assumed in the base case, the area involved appears too small for me to account for this as a downward pressure. Any uncertainty in this factor can be better addressed in the analysis that supports the next determination.

(iii) silvicultural treatments to be applied to the area:

Silvicultural systems

Approximately 95% of the TSA harvest is clearcut or clearcut with reserves. The reserves often provide wildlife tree patches for stand-level biodiversity. About 5% of the TSA is harvested using selection systems such as group selection and shelterwood. These systems occur within dry belt Douglas-fir stands, and in mixed lodgepole pine – Douglas-fir stands where fir reserves are commonly retained.

The timber supply analysis accounted for these silvicultural systems. For example, as previously discussed under *single tree selection,* areas for selection harvesting were identified and specific yield tables and a harvesting strategy was developed.

In the base case, a 15 cubic metre per hectare volume reduction was assigned to all individual lodgepole pine – Douglas-fir stands existing natural and managed yield curves. This additional reduction was intended to reflect higher retention levels associated with selection harvesting systems.

In reviewing this factor with BCSF staff, I certainly support the efforts made to leave structure on cutblocks given its importance for stand-level biodiversity. For selection systems, improved information on retention levels and growth and yield, particularly in lodgepole pine – Douglas-fir stands would be desirable so that timber supply implications can be better accounted for in future determinations. I encourage district staff and licensees to work together to on this task.

Incremental silviculture

In general, incremental silviculture includes activities such as commercial thinning, juvenile spacing, pruning, fertilization, that are not part of the basic silviculture obligations required to establish a free-growing forest stand.

No incremental silvicultural activity is assumed in the timber supply analysis. BCFS district staff believe this reasonably reflects current practice since very little incremental

silvicultural activity (including no commercial thinning) has recently occurred in the Merritt TSA.

The level of incremental silviculture undertaken in a given management unit is very dependent on funding and is difficult to project into the future. If the amount of incremental silviculture actually practised differs significantly from that assumed in the analysis, this can be reflected in future AAC determinations. For the purposes of this determination, I am satisfied with the treatment of this factor in the analysis.

(iv) the standard of timber utilization and the allowance for decay, waste and breakage expected to be applied with respect to timber harvesting on the area:

Utilization standards

Utilization standards define the species, dimensions and quality of trees that are harvested and removed from an area during harvesting operations. In the timber supply analysis, a 30-centimetre maximum stump height and 10-centimetre minimum top diameter was assumed for all species. In addition, for lodgepole pine, a 12.5 centimetre minimum diameter at breast height (DBH), and for all other species, a 17.5 centimetre DBH, was modelled.

Small diameter (smallwood) pine stands are in fact utilized to a 7.5-centimetre DBH, a 20-centimetre maximum stump height and a 7-centimetre minimum top diameter. However, the model used in the analysis was not calibrated to account for this level of utilization. The discrepancy between what was modelled in the base case and current practice is similar to what occurred in the previous 2001 timber supply analysis and was addressed by the chief forester in the previous AAC determination. As documented more fully in that determination, this discrepancy represented an upward pressure of 62 500 cubic metres per year for smallwood pine stands and resulted in the chief forester increasing the partition from 250 000 to 312 500 cubic metres for these stands.

I have accounted for this continued 62 500 cubic metres as an upward pressure on timber supply in my "Reasons for decision." The upward pressure exists in the short- and mid-term since regenerated managed stands are not likely to have small diameter problems that exist with current unmanaged stands.

Decay, waste and breakage

The VDYP model used in the timber supply analysis to project volumes for existing unmanaged stands incorporated estimates of volumes of wood lost to decay, waste and breakage. These estimates of losses have been developed for different areas of the province based on field samples. As previously discussed, operational adjustment factors (OAFs) were used in the timber supply analysis to account for decay, waste and breakage in volume estimates for regenerated managed stands.

Net volume adjustment factor (NVAF) sampling in the Merritt TSA has not yet been completed. The results from NVAF field samples correct for any inherent biases when

estimating net tree volumes. I encourage completion of this VRI project as these results can be used to better account for this factor in support of future timber supply analyses.

In the meantime, for this determination, I am satisfied that standard and appropriate procedures were followed to account for decay, waste and breakage in the base case and represent use of best available information.

(v) the constraints on the amount of timber produced from the area that reasonably can be expected by use of the area for purposes other than timber production:

Integrated resource management objectives

The Ministry of Forests and Range is required under the *Ministry of Forests Act* to manage, protect and conserve the forest and range resources of the Crown and to plan the use of these resources so that the production of timber and forage, the harvesting of timber, the grazing of livestock and the realization of fisheries, wildlife, water, outdoor recreation and other natural resource values are coordinated and integrated. The Forest Practices Code, the *Forest and Range Practices Act* and other legislation provide for, or enable, the legal protection and conservation of timber and non-timber values. Accordingly, the extent to which integrated resource management (IRM) objectives for various forest resources and values affect timber supply must be considered in AAC determinations.

The timber supply analysis has addressed some IRM objectives through reductions in the timber harvesting land base. I have accounted for these factors in 'Land base contributing to timber harvesting.' In this section, I account for IRM objectives where the land base continues to contribute to timber supply but are subject to various forest cover and adjacency constraints.

- *cutblock adjacency, forest cover and green-up*

To manage for resources such as water, wildlife and scenic areas, and to avoid concentrating harvesting-related disturbance in particular areas, operational practices limit the size and shape of cutblocks and maximum disturbances (areas covered by stands of less than a specified height), and prescribe minimum green-up heights required for regeneration on harvested areas before adjacent areas may be harvested. Green-up requirements help to achieve objectives for water quality, wildlife habitat, soil stability and aesthetics. Adjacency, green-up and forest cover objectives guide harvesting practices to provide for a distribution of harvested areas and retained forest cover in a variety of age classes across the landscape.

In the timber supply analysis for the Merritt TSA, in order to represent the desired conditions necessary to meet the various objectives in different areas of the TSA, the timber harvesting land base was categorized into resource emphasis areas (REAs) with varying forest cover requirements. REAs were identified for integrated resource management, community watersheds, mule deer winter range, elk movement corridors,

and scenic areas. The forest cover requirements for each REA are addressed in the following sections.

- integrated resource management (IRM)

In the timber supply analysis, assumptions modelled for integrated resource management REA include a minimum green-up height of 3 metres and a maximum disturbance of 33%. The analysis also applied spatially explicit adjacency control for the first 3 decades that did not allow harvesting of adjacent cutblocks until the 3 metre green-up was achieved. For expedited major salvage activities in the TSA, adjacency rules may be relaxed.

A sensitivity analysis was performed that assessed increasing or decreasing green-up heights. A one metre increase in green-up resulted in a significant 15% decrease in short-term timber supply, whereas a one metre decrease had no observable impact on harvest flows in the short term.

In reviewing this information, I am satisfied that the timber supply analysis appropriately accounted for green-up and cutblock adjacency in the integrated resource management area based on consideration of this factor alone. Relaxation of green-up in IRM areas provides, however, an opportunity to increase short-term timber supply to address the AAC uplift issue and I discuss this later under *mountain pine beetle epidemic*.

- scenic areas

Careful management of scenic areas is an important IRM objective requiring that visible evidence of harvesting be kept within acceptable limits. The Code and FRPA enable scenic areas to be designated and visual quality objectives (VQOs) to be established to limit the amount of visible disturbance due to forest practices.

Scenic areas have been established for about 70 000 hectares of the Crown productive land base in the Merritt TSA near specific highways, lakes and trails. The 2003 timber supply analysis used existing VQOs where established, and recommended VQOs where they have not yet been formally established. Constraints were modelled for each VQOs (preservation, retention, partial retention and modification) based on visual absorption capability (VAC). For example, for a partial retention VQO in a moderate VAC area, a maximum removal area of 15% was assumed where young stands needed to achieve a visually effective green-up (VEG) height of 4 metres (about 19 years of age) before additional harvesting could occur. The maximum removal percentages were determined using standard procedures (i.e. *Procedures for Factoring Visual Resources into Timber Supply Analyses*) as modified by district staff in consultation with the regional landscape forester. The selection harvest regimes used in the analysis were assumed to meet all VQOs.

After the 2003 timber supply analysis was undertaken, the district manager, using updated visual landscape inventory, revised the scenic area mapping and established VQOs for the TSA. This accounted for approximately 20% more area being managed as scenic areas than assumed in the 2003 analysis. The impact of using the new inventory was estimated to be a reduction in timber supply of about 7000 cubic metres per year for 80 years; this

impact could potentially be mitigated in the short-term by alternate harvest flow assumptions.

BCFS district staff also report increased operations in scenic areas because of mountain pine beetle harvesting. In some circumstances, the Code and FRPA allow for the management of less stringent VQOs in the short term in order to harvest mountain pine beetle infested and susceptible stands. This allowance reflects current practice and therefore represents an unknown upward pressure in timber supply than assumed in the base case.

In reviewing this information, the downward pressure exerted by an increased area with VQOs than assumed in the timber supply analysis appears to be offset by the upward pressure exerted by variances that are appropriately issued to address mountain pine beetle infestations in scenic areas. As a consequence of these offsetting pressures, I do not need to make volume adjustments based on this factor in my determination.

- ungulate winter range and elk corridors

Although ungulate winter ranges in the Merritt TSA have not been designated, notice of ungulate winter range objectives has been issued under section 7(2) of the *Forest Planning and Practices Regulation* for mule deer, bighorn sheep, elk, moose and mountain goats. BCFS staff note that the maximum areas and timber supply impacts specified in the notice are consistent with the impacts assumed in the 2001 timber supply analysis that supported the last AAC determination by the chief forester.

The 2001 timber supply analysis the supported the previous determination by the chief forester was based on best available mapping and forest cover guidelines at the time regarding deer winter range. As an innovative forestry practices, refined mapping of deer winter range subsequently occurred. The 2003 timber supply analysis identified 98 mule deer winter range assessment units jointly identified by MWLAP and NSIFS. Updated forest cover requirements applied to the units were similar to those identified in the adjacent Okanagan-Shuswap LRMP. As a consequence, the base case reflects about 48 000 cubic metres per year of additional short-term timber supply relative to the 2001 analysis. The NSIFS proposed IFPA-related AAC increase assumed these volume increases. The regional manager accepted most of this increase in his 2004 IFPA AAC decision.

Elk movement corridors have not been legally established but are recognized as part of forest management in a portion of the TSA. Although specific guidelines have yet to be developed, the timber supply analysis accounted for current practices by recognizing these areas as a resource emphasis area. In the corridors, no more than 20% of the productive forest area may be less than 3 metres in height and at least 40% of the forest must be at least 20 metres in height. Since the analysis, the location of these corridors have been updated but BCFS staff do not expect any appreciable timber supply impacts associated with these adjustments.

In reviewing this factor with staff, I accept the modelling for ungulate winter range and elk movement corridors as a reasonable accounting of these considerations for the purposes of this determination.

- community watersheds

The 10 designated community watersheds within the Merritt TSA encompass 10 683 hectares (1.6%) of the timber harvesting land base. In order to approximate current management, a maximum of 20% of the total forested land base in each community watershed could be less than 6.6 metres in height in the timber supply analysis. The analysis also assumed that areas with selection management satisfy any forest cover and green-up requirements in community watersheds. A 100-metre buffer was also applied upslope of intake structures; this resulted in 3 hectares being deducted from the timber harvesting land base.

Interior Watershed Assessment Procedures and Overview Hydrologic Assessments have been completed for most of the community watersheds. As a result of these assessments, BCFS district staff believe that the 20% maximum disturbance requirement assumed in the timber supply analysis may over-estimate timber supply impacts and that a 25 to 30% maximum disturbance constraint may be more appropriate.

Based on these observations, I recognize that there may be greater timber supply flexibility than modelled in the base case and encourage monitoring of forest practices in community watersheds so that assumptions employed in subsequent timber supply analyses can be refined. In the meantime, for the purposes of this determination, I accept how this factor was accounted for in the timber supply analysis.

- grizzly bear management

The North Cascades Grizzly Bear Recovery Plan identifies two areas in the Merritt TSA with draft management strategies. BCFS and MWLAP staff do not expect grizzly bear management strategies will have a significant impact on timber supply in the TSA. Grizzly bear is an identified wildlife for which wildlife habitat areas could be established; although none have been established in the Merritt TSA, this may occur in the future.

No additional forest management constraint was applied in the timber supply analysis to address grizzly bear management. When decisions are made in the future concerning the management of grizzly bears, these can be modelled in subsequent timber supply analyses. For the purposes of this determination, I am satisfied that the base case has appropriately accounted for this factor.

- landscape-level biodiversity and old forest retention

Landscape-level biodiversity can be conserved by maintaining forests with a variety of patch sizes, seral stages, and forest stand attributes and structures, across a variety of ecosystems and landscapes. Given other forest management provisions that provide for a diversity of forest stand conditions, old forest retention is often considered a key landscape-level consideration. Old forest retention can be achieved through the location of old growth management areas (OGMAs).

OGMAs have not been established in the Merritt TSA. As a result, in the 2003 timber supply analysis, a 3.9% reduction to the timber harvesting land base was applied equally to all landscape units to model the expected impact of OGMAs as proposed by the

NSIFS. In 2004, an old growth order was approved by MSRM that provides non-spatial old forest retention requirements for various biogeoclimatic ecosystem classification (BEC) units and landscape units within the Merritt TSA and will remain in place until spatial OGMAs are established.

Currently, draft OGMAs have been identified in the TSA based on the efforts of MSRM, other agency staff, forest licensees and several First Nations groups. The draft OGMAs represent current practice in that licensees are avoiding harvesting in these areas. Some minor adjustments to the OGMA locations or boundaries is still occurring, and they are expected to be approved. MSRM staff believe the impact of legally establishing the OGMAs would be about 6% on the timber harvesting land base – about 2.1 percentage points higher than the 3.9% assumed in the base case.

In reviewing this information, I find that the opinion of MSRM about the draft OGMAs is likely a better reflection of current practice than what was modelled in the 2003 timber supply analysis. The additional 2.1% impact represents the best available information with respect to the timber supply implications associated with the OGMAs relative to what was modelled in the base case. I have therefore recognized in my "Reasons for Decision" a 2.1% downward pressure (about 39 000 cubic metres per year) on timber supply throughout the harvest forecast.

The timber supply analysis assumed that forest outside the timber harvesting land base will continue to age and would not be disturbed. In fact, fire and other agents can disturb these stands. The contribution of forests outside the timber harvesting land base is an important modelling consideration when old forest retention requirements are addressed aspatially. For this determination, I have accounted for the spatial location of draft old growth management areas. I do recognize, however, that achievement of other forest cover objectives could be affected by this modelling assumption, and I am mindful of this risk and uncertainty in my determination. I encourage a more realistic accounting for disturbance in the next timber supply analysis under "Implementation".

- wildlife tree patches

Wildlife tree patches are an important part of stand-level biodiversity. The Code and FRPA both provide for the retention of wildlife trees in harvested areas. In the timber supply analysis, an overall volume reduction of 1.12% was applied to both natural and managed stands to account for wildlife tree retention. BCFS do not believe the assumptions used in arriving at the 1.12% reduction fully account for this factor; for example non-timber harvesting land base areas were considered suitable as wildlife tree patches when in fact this may not always be so. MSRM and MWLAP staff also expressed concern about how wildlife tree retention was modelled in the 2003 analysis.

BCFS staff consider the 5.5% reduction applied in the 2001 timber supply analysis, and accepted in the previous AAC determination by the chief forester, as a more appropriate accounting for wildlife tree retention. Overlaps with land base reductions for OGMAs may reduce the additional timber supply impacts with wildlife tree patches but this has not been assessed.

To more appropriately account for the potential impacts of wildlife tree retention, I recognize in my "Reasons for Decision" a 4% (about 80 000 cubic metres per year) downward pressure on timber supply throughout the harvest forecast. This accounts for an undetermined but likely overlap between OGMAs and wildlife tree patches.

- identified wildlife

"Identified wildlife" are those wildlife species and plant communities that have been approved by MWLAP as requiring special management. The province's Identified Wildlife Management Strategy (IWMS) addresses plant communities and species at risk, and regionally significant species, that have not been accounted for by other existing management strategies. For example, for protected areas, biodiversity, riparian management or ungulate winter range.

Identified wildlife can be protected through the establishment of wildlife habitat areas (WHAs) with objectives or general wildlife measures. The objectives or general wildlife measures may preclude or constrain timber harvesting activity depending on the requirements of individual identified wildlife species or communities.

Government policy direction under the Code, which continues under FRPA, is to limit the timber supply impact of the IWMS to one percent. Operational policy direction has been to initially allocate the one percent impact equally to each forest district with acknowledgement that this approach can be refined if warranted.

The timber supply analysis reduced the timber harvesting land base by 60 hectares to account for a tailed frog WHA. Currently there are 17 WHAs totalling 655 hectares with an estimated additional impact of 142 hectares of mature timber within the timber harvesting land base.

Although few WHAs have been established in the TSA, the decision to account for a 1% timber supply impact of implementing the IWMS has been made by government. Therefore I normally recognize the impact of the IWMS in my decisions. As a consequence, I consider the approach taken in the timber supply analysis to have underestimated the impact of accounting for identified wildlife for the purposes of this determination. I therefore recognize in my "Reasons for Decision" a 1% downward pressure (about 20 000 cubic metres per year) on timber supply throughout the harvest horizon.

- community fire interface

The residents of most communities in the Merritt TSA are at high to extreme threat from wildfires. Sixty years of active fire exclusion has resulted in fuel accumulation in forested areas that are higher than would occur naturally. Government has stated support for the Filmon Report that was prepared after a careful review of the devastating 2003 fires. Full implementation of the report will take time and funding. Current thinking is to identify a fire interface area – BCFS Protection Branch would like to see a 2-kilometre interface area surrounding communities – and manage that area primarily for public safety from wildlfire. These areas may not be managed for sustainable timber

production – the area could be harvested to reduce stems per hectare and then underburned to reduce fuel accumulations. Fire interface assessment plans should be completed shortly for the communities of Merritt, Princeton and Eastgate where follow-up treatments are expected.

The effect of community fire interface is not fully known at this time and was not modelled in the 2003 timber supply analysis. BCFS staff noted a number of key provincial policy issues around the fire interface issue that need to be addressed to help ensure the right incentives are in place to undertake appropriate treatments.

I appreciate BCFS staff identifying and describing this important issue particularly given its significance to communities in the TSA. As policy and management direction for community fire interface areas are clarified, this can be factored into subsequent timber supply analyses. For the purposes of this determination, I will not speculate on what this future direction may be, and therefore make no adjustment for this factor.

(vi) any other information that, in the chief forester's opinion, relates to the capability of the area to produce timber;

Other information

- harvest sequencing

In timber supply analysis, the order in which eligible stands are assumed to be harvested can affect the projected timber supply in a number of ways. Any difference between the modelling assumptions made and the order in which stands are actually harvested in operational practice must be examined and accounted for.

For the Merritt TSA timber supply analysis model, the oldest available forest stands are harvested first. No priority was assigned small diameter pine stands, but the harvest level was capped at 250 000 cubic metres per year for 70 years. The timber volume associated with 250 000 cubic metres includes an additional 62 500 cubic metres per year of upward pressure that I recognized in *utlization standards*. No harvest priority was assigned to single tree selection areas either.

Although harvests operationally may deviate from the rules used in the analysis, the tight availability of stands modelled in the base case dictates that most available stands will be harvested as they become available regardless of the harvest rule used. Therefore, after reviewing this factor with BCFS staff, I conclude that the modelling assumptions are reasonable for use in support of this determination.

- actual harvest level

From 1996 to 2004, actual harvest levels represent on average about 96% of the AAC. Licensees have generally been able to respond to previous uplifts in response to fire damaged and beetle infested stands based on recent harvest level history. Based on this information, there is no reason for me to believe the AAC can not be delivered, including any uplifts required to address the current mountain pine beetle epidemic, based on past operational practices. I have taken this consideration into account in my determination.

- Innovative Forest Practices Agreement

All licensees with replaceable forest licences in the Merritt TSA have Innovative Forestry Practices Agreements (IFPAs). Working collaboratively together as the Nicola–Similkameen Innovative Forestry Society, the licensees have undertaken a number of projects reflected in the timber supply analysis. The timber supply analysis includes the work done by the IFPAs, so no uncertainty in the base case is expected at this time based on the IFPA activities within the TSA.

The regional executive director's decision under Section 59.1 of the *Forest Act* regarding an increase in the AAC authorized in a IFPA-holder's licence based on innovative forestry practices, differs from my Section 8 AAC decision. While the regional executive director's decision should consider the factors that I consider under Section 8(8), the regional executive director can limit an increase to a period of time, land type, timber type or subject it to specific conditions. The flexibility for conditions under Section 59.1 may enable the regional executive director to balance short-term risks with appropriate conditions. As such, independent decision-makers using similar information and analysis but working under different decision processes may have different views of risk and uncertainty. I also note that if the regional executive director were to reduce an AAC increase, I would likely consider if changes in information available to the regional executive director have implications for my decision. Some of the interests raised by First Nations have been forwarded to the regional executive director for consideration (see *First Nations consideration* below).

- Land and resource management planning

About 70% of the province has completed strategic land use plans including Land and Resource Management Plans (LRMPs). Several other areas of the province have LRMPs underway or nearly completed. No LRMP process however is underway in the Merritt TSA. The Sierra Club submission requested that a land use planning process be undertaken for the TSA. MSRM is responsible for determining where and when LRMPs are to be undertaken.

BCFS district staff note that although an LRMP has not been carried out in the TSA, many of the values an LRMP would normally address are being managed and conserved. Current management practices for many of these values have been discussed in this

document such as old growth management areas, riparian management, scenic areas, ungulate winter range and elk corridors.

In my determination, in keeping with my guiding principles, I will not speculate on land use decisions that may be made in the future in the Merritt TSA. Delaying AAC determinations until after land use planning is completed is also not appropriate as timely decisions about timber supply would not be made. Such delays in the past led to the legislative change requiring AACs to be determined every 5 years. At any rate, any future land use decisions can be accounted for in subsequent determinations. However I am also mindful in my review of forest practices in the TSA of the many values being addressed through the *Forest and Range Practices Act* and current management.

- First Nations considerations

First Nations that reside in and/or have asserted traditional territories within the Merritt TSA were consulted about this timber supply review. The following Bands/Councils were contacted: Coldwater Indian Band, Cook's Ferry Indian Band, Lower Nicola Indian Band, Lower Similkameen Indian Band, Nicomen Indian Band, Nicola Tribal Association, Nlaka'pamux Tribal Council, Nooaitch Indian Band, Okanagan Nation Alliance, Shackan Indian Band, Siska Indian Band, Upper Nicola Indian Band, Upper Similkameen Indian Band, and the Westbank Indian Band.

Consultation was based on a number of different forums including phone discussions, First Nations representatives at TSA planning meetings/TSA Uplift meetings/Uplift subcommittee meetings, letters and individual meetings with First Nations.

Forest and range agreements (FRAs) are interim agreements between MOF and eligible First Nations designed to provide for workable accommodation of aboriginal interests that may be impacted by forestry decisions during the term of the agreement until such time as those interests are resolved through treaty. FRAs provide First Nations a direct award forest tenure and a share of forestry revenues. All First Nations with asserted aboriginal interests in the Merritt TSA have been offered FRAs, and two First Nations have signed agreements. Consistent with the agreements, the ministry has undertaken a First Nation consultation process that was specific to this timber supply review and this AAC determination.

As discussed under my "Guiding Principles", it is inappropriate for me to attempt to speculate on the impacts on timber supply that may result from decisions that have not yet been made by government. Any decisions on treaty negotiations made in the future by government and First Nations can be reflected in subsequent AAC determinations.

First Nations raised the following issues and concerns for my attention as I determine the AAC for the Merritt TSA:

- while the AAC uplift is supported, there is concern about the economic and environmental impacts of increased forest harvesting;

- in order to meaningfully participate in the management and rehabilitation of the land, funds are needed to collect, store and use traditional use data, and to undertake referrals and consultations;
- as stewards of the land, First Nations would like to participate in developing a restorative plan that addresses the protection and/or conservation of aboriginal interests;
- it is not clear what happens to First Nations use of affected lands and resources after the trees are harvested or killed;
- the need to implement a referral process that is of a higher standard than that conducted by the forest industry because historical sites cannot be recovered if they are disturbed;
- inability to fully participate in the referral process because of the cost;
- impacts on the environment and First Nations culture are being planned for without input from local First Nations; First Nations need to be at the planning table to provide input into strategies to mitigate impacts on First Nations culture and the environment;
- a mutually acceptable process for dealing with land and resources over which First Nations claim rights or title is needed; an acceptable process must include a mandate by government to recognized and accommodate aboriginal title;
- for economic reasons, First Nations need a fair and equitable share of the AAC;
- apart from Stuwix Resources Ltd, which does not have an operating area, the bands receive no other benefit from the uplift;
- a replaceable forest license to ensure the long-term viability of Stuwix Resources Ltd is needed;
- forest and range agreements (FRAs) do not allow enough latitude to address First Nations interests in this catastrophe; and
- desire to participate in the forest industry but find the FRAs too rigid.

Some of the input received above from First Nations during the timber supply review process were about important issues that are, however, not directly related to my area of authority. They include general concerns about the allocation of timber rights, improvements in FRAs, and the need for improved capacity to participate in the future planning initiatives and referral processes. While I am unable to address these concerns, I will make those concerns and interests known to other appropriate decision-makers. For example, I am aware of the issue of improved capacity is a general concern of First Nations and I will once again raise this concern within the ministry particularly in situations where there is a significant increase in the AAC such as in the Merritt TSA. I will ensure those concerns and interests are known to decision-makers who are addressing AAC uplift requirements through the IFPA as well as through ongoing operational decisions. I also note that there is a separate consultation process in effect regarding timber allocation decisions related to the apportionment of the AAC that are not part of my decision authority under Section 8 of the *Forest Act* that only empowers me to determine the AAC.

General input was also received from First Nations on issues that do relate to my decision including concerns expressed about the potential impacts of an AAC uplift on aboriginal interests related to the environment and cultural heritage resources.

With respect to the environmental concerns related to an AAC uplift, as discussed later under the *mountain pine beetle epidemic*, all of the management constraints and land base reductions incorporated in the base case for specific resource values are comprised even in the beetle uplift forecasts and as such are reflected in an uplift decision. For example, manage constraints and land base reductions that still apply in an uplift forecast include *ungulate winter range and elk corridors, community watersheds, landscape-level biodiversity and old forest retention, wildlife tree patches, identified wildlife, riparian management, environmentally sensitive areas, etc.* I discuss also under *mountain pine beetle epidemic* the improved opportunities to renew the forest with an uplift in the AAC.

With respect to cultural heritage values, I have addressed these values under *archaeological and cultural heritage resources.* I concluded there that the base case reasonably accounted for management of these resources. In *archaeological and cultural heritage resources*, I also noted the operational approach taken in the TSA to address aboriginal interests at the forest development planning stages. This provides an opportunity to address potential impacts on traditional uses and effects on botanical forest products, range and wildlife. I support the various mechanisms employed in the district to involve First Nations prior to plan approval, and encourage continuation and improvement of these opportunities as a means to reduce impacts and accommodate interests at the operational level.

In reviewing First Nations input, I believe my determination has reflected on the interests and concerns expressed that relate to my area of authority. I will convey First Nations interests and concerns to others in this Ministry who are in a position to consider and address those that are beyond the ambit of my jurisdiction.

(b) the short and long term implications to British Columbia of alternative rates of timber harvesting from the area;

Alternative harvest flows

The nature of the transition from harvesting old growth to harvesting second growth is a major consideration in determining AACs in many parts of the province. In keeping with the objectives of good forest stewardship, AACs in British Columbia have been and continue to be determined to ensure that short-term harvest levels are compatible with a smooth transition to medium and long-term levels. Timber supplies need to remain sufficiently stable so that there are no inordinately adverse impacts on current or future generations. To achieve this, the AAC determined must not be so high as to cause later disruptive shortfalls in supply nor so low as to cause immediate social and economic impacts that are not required to maintain forest productivity and future harvest stability.

The base case harvest forecast for the Merritt TSA was developed to provide an initial harvest level that still allows a smooth transition from short-term levels to medium and

long-term levels. Although no alternative harvest flow was completed, a non-declining alternative harvest flow can be inferred to be equivalent to the long-term harvest level in the base case.

Several sensitivity analyses were provided as part of the timber supply analysis which I have reviewed in my determination to account for uncertainty and risk associated with some of the assumptions used in the model. In addition, sensitivity analyses was also provided to me about increasing initial harvest levels that I discuss below under *mountain pine beetle epidemic.*

In making my AAC determination I have considered the base case forecast and alternate rates of timber harvest demonstrated through several sensitivity analyses provided in support of this decision.

Community dependence on the forest industry

The public sector and forestry are overwhelming the largest contributors to the local economy in the Merritt TSA. The forest sector supports numerous other jobs in the area through companies and employees purchasing goods and services from local businesses. Each 100 full-time direct forestry jobs in the TSA are estimated to support another 20 to 40 jobs, depending on the forestry activity (harvesting or timber processing). In comparison, 100 direct jobs in the public sector support 10 to 20 indirect and induced jobs, while 100 tourism jobs support an additional 6 to 13 positions. I have taken these considerations into account in my decision.

(c) the nature, production capabilities and timber requirements of established and proposed timber processing facilities;

This section of the *Forest Act* was repealed in 2003. [2003-31-2 (B.C. Reg. 401/2003)]

(d) the economic and social objectives of the government, as expressed by the minister, for the area, for the general region and for British Columbia;

Minister's letter and memorandum

The Minister has expressed the economic and social objectives of the Crown for the province in two documents to the chief forester—a letter dated July 28, 1994 (attached as Appendix 3) and a memorandum dated February 26, 1996 (attached as Appendix 4).

This letter and memorandum provide a government view on forest stewardship, a stable timber supply, and allowance of time for communities to adjust to harvest-level changes in a managed transition from old-growth to second-growth forests, so as to provide for community stability.

The Minister stated in his letter of July 28, 1994, that 'any decreases in allowable cut at this time should be no larger than are necessary to avoid compromising long-run sustainability.' He placed particular emphasis on the importance of long-term community stability and the continued availability of good forest jobs. To this end he asked that the chief forester consider the potential impacts on timber supply of commercial thinning and

harvesting in previously uneconomical areas in order to help maintain harvest levels. To encourage this the Minister suggested consideration of partitioned AACs.

I reviewed commercial thinning under *incremental silviculture;* BCFS staff note that no commercial thinning has occurred in the TSA since the last determination and none was assumed in the timber supply analysis. As discussed under *inoperable areas and unstable terrain*, I have reviewed the operability assumptions in the timber supply analysis. I am satisfied that they are based on the best information currently available. The timber supply analysis demonstrates that harvest levels can be maintained in the short and mid-term without commercial thinning or harvesting in previously uneconomic areas. Given this information, I see no helpful reason to establish specific harvest levels attributable to particular areas, species, or terrains (i.e. partition) in this TSA at this time to address commercial thinnings and previously uneconomic (inoperable) areas. I do address the need for continuation of a partition for smallwood pine in my "Reasons for Decision."

The Minister's memorandum addressed the effects of visual resource management on timber supply, asking that the constraints applied to timber supply to meet VQOs not be allowed to unreasonably restrict timber supply. As noted in *scenic areas,* the timber supply analysis addressed the timber supply impacts from visual resource management by following standard procedures developed for timber supply review. These procedures were developed in consideration of the Minister's memorandum. I am satisfied this approach addresses the objectives expressed by the minister.

Local objectives

The Minister's letter of July 28, 1994, suggests that the chief forester should consider important social and economic objectives that may be derived from the public input in the timber supply review where these are consistent with government's broader objectives.

Several expressed local objectives focussed on taking corrective action to address the mountain pine beetle epidemic in the TSA. Recognizing the potential impact of the beetle on timber supply in the TSA, and community dependence on forestry, numerous expressions of support for an AAC uplift were received. These include the Mayors and Councils of Merritt and Princeton, Pubic Advisory Group of the NSIFS, the Merritt Tourism & Economic Committee, Merritt Community Futures, Merritt Chamber of Commerce, Princeton Community Skills Centre, Nicola Valley Stock Breeders Association, Nicola Tribal Association, and Chief and Council of seven of the eight First Nations bands within the Merritt TSA, as well as general public support expressed at public meetings held in both Princeton and Merritt.

Several technical questions were also raised about the mountain pine beetle epidemic and uplift issue at open houses held in Princeton and Merritt. Comments were also provided by groups or societies from outside the TSA such as from the BC Chapter of the Sierra Club of Canada (e.g. see *protected areas* and *land and resource management planning*).

District staff shared with me the many comments received including those from First Nations that I discussed earlier under *First Nations considerations*. I have taken these comments as an expression of local objectives into account in my determination.

(e) abnormal infestations in and devastations of, and major salvage programs planned for, timber on the area.

Forest health

Several biotic and abiotic factors affect forest health in the Merritt TSA other than mountain pine beetle. Biotic factors include defoliators such as the western spruce budworm and root diseases. Abiotic factors include fire and windthrow. The affects of these factors are being monitored through aerial overflights that provide general strategic information about forest health. Some ground-based stand-level monitoring is also occurring where the effects of these forest health agents on future timber supply is being assessed.

The relatively mild climates experienced recently in the province, including the Merritt TSA, are often favourable to both biotic and abiotic forest pests such as insects and fire. The monitoring efforts being undertaken need to continue or expand so that the effects of these agents on timber supply can be better understood and appropriate management action taken.

Unsalvaged losses and small scale salvage

Unsalvaged losses are timber volumes destroyed or damaged, by such agents as fire or disease, that are not recovered through salvage operations. In regenerated forests, a number of parasites, fungi or plants can kill trees or degrade the quality and value of logs.

Estimates for unsalvaged losses account for epidemic (abnormal) infestations and for factors that result in losses that are not recovered through salvage harvest programs and are not recognized in yield estimates. Timber volume losses due to insects and diseases that normally affect stands (endemic losses) are accounted for in inventory sampling for existing timber yield estimation or through other methods. Endemic losses associated with second-growth stands are addressed by application of operational adjustment factors (OAFs) as noted under *volume estimates for regenerated managed stands*.

Although about 80% of harvesting in the TSA was directed at salvage or beetle control between 1996 and 2000, not all losses are salvagable. The timber supply analysis assumed annual unsalvaged losses of 143 626 cubic metres which was deducted from all harvest level forecasts. This included 53 007 cubic metres from mountain pine beetle, 40 834 cubic metres from spruce bark beetle, 31 220 cubic metres from wildfire, and 18 565 cubic metres from windthrow. These estimates are based on those derived in the previous 2001 timber supply analysis for the Merritt TSA.

There has recently been a significant increase in the level of beetle activity and I address this concern more fully under *mountain pine beetle epidemic* below. This is resulting in even a greater percentage of harvesting being directed at beetle control. If the beetle epidemic is left unchecked, far greater unsalvaged losses could affect the TSA in the future than assumed in the base case.

The small scale salvage program captured about 60 000 cubic metres of otherwise unsalvaged losses in 2003/04 and the expectation is to issue at least 100 000 cubic metres

of additional licenses in 2004/05 to help address this concern. Currently small scale salvage harvesting is being overcharged to the Forest Service Reserve (which has an allocation of 22 468 cubic metres that is primarily intended to cover a variety of non-ministry demands) since no AAC apportionment exists for this program.

BCFS staff note that unsalvaged losses assumed in the 2003 timber supply analysis are based on the best available information at the time the analysis was undertaken. Given the significance of the mountain pine beetle epidemic on timber supply which I account for next, and the uncertainty on future unsalvaged losses due to the epidemic, I am satisfied that for the purposes of this determination that the base case has adequately accounted for this factor. I do account in my "Reasons for Decision" for the important contribution of small scale salvage in helping reduce unsalvaged losses and deliver the AAC and the need to apportion AAC to this program.

Mountain pine beetle epidemic

Mountain pine beetles are part of the natural process in lodgepole pine ecosystems. However, the current provincial outbreak has reached an unprecedented level in BC's history of recording such events. The 2004 annual aerial overview survey indicates that over 7 million hectares of the province are affected including about 4 million hectares in the Southern Interior Forest Region. An immediate collapse to the beetle infestation does not appear likely since the recent trend of warm winters is expected to continue. BCFS staff project that by 2006, 50% of the lodgepole pine volume in the BC's interior will be affected. This huge pine mortality affects available timber supply and habitat, and associated economic and environmental values.

The impacts of rapid expansion of the mountain pine beetle in other parts of the province underscore the probability that a similar situation is developing in the Merritt TSA. In 2003, an aerial survey in the TSA mapped 7500 hectares of pine-infested forests. The 2004 aerial survey mapped 30 000 hectares of infestation which represents a four-fold expansion in just one year. The mountain pine beetle spreads by taking flight in the summer. The affects of the 2004 beetle flight(s) will not be known until the 2005 aerial survey is conducted in this summer 2005 when affected trees can be visibly detected.

It is estimated that the volume of mature (greater than 60 years old) timber on the timber harvesting land base in the Merritt TSA is approximately 116 million cubic metres. Of this, about 60 million cubic metres (about 50%) is lodgepole pine. Forest health surveys and mountain pine beetle projections to 2005 indicate that about 4.5 million cubic metres of pine are currently affected by the beetle. If one assumes that the beetle infestation in the TSA stops today and the beetle-killed wood is useable for 5 years, then there would be no need to increase the AAC. Harvesting at the current level would be sufficient to recover almost all the affected timber in less than three years.

However, an immediate halt to the beetle infestation is not likely if the recent trend of warm winters continue which is likely particularly in southern areas of the province like the Merritt TSA. Predictive models by BCFS staff indicate rapid infestation of susceptible pine types in future years within the TSA. With no management intervention,

the model predicts about 140 000-hectares of affected forests resulting in about 21.5 million cubic metres of dead pine volume by 2010 (within 5 years). Beetle-killed pine normally needs to be salvaged within 5 years before volumes are no longer commercially usable for sawlogs. Based on this predictive model which assumes no management intervention, the average 5-year shelf-life of dead pine, and the infestations continuing to 2010, various sensitivity analyses were performed to determine the effect of alternative harvest levels on timber supply. Each sensitivity analysis described below targets only the hardest hit stands for harvesting (e.g. mature pine-leading stands).

Assuming no increase in the AAC, about 16.1 million cubic metres of dead pine will remain unsalvageable in 2015. An AAC uplift to 2.5 million cubic metres leaves about 13.7 million cubic metres of unsalvageable pine in 2015. An AAC uplift to 2.8 million cubic metres still leaves about 13.5 million cubic metres of unsalvageable pine in 2015. These 13.5 million cubic metres are very dispersed across the land base, and in stands with a minor pine component, and are therefore assumed in the sensitivity analysis to not be harvestable.

The above models, based on no management intervention, suggest huge pine losses in the Merritt TSA over the next 10 years. To address this concern, the Cascade Forest District's developed a strategy is based on management intervention. The strategy's approach to deal with the epidemic is to harvest areas of recent attack (infested stands) quickly and aggressively in an attempt to slow or delay the expansion of the beetle population. Mountain pine beetle populations are currently at low or moderate levels of infestation so management strategies to contain the expansion are likely to be more successful than in other timber supply units where the infestation already covers vast tracts of timber. The TSA also has a diverse landscape in terms of topography, elevation and species mix that makes management of the beetle more probable than in other areas of the province. The Cascade Forest District has developed specific management objectives to support the strategy and efforts to contain the infestation.

Consistent with the strategy, the NSIFS developed a draft Forestry Plan in March 2005 that has been submitted for approval; the plan describes the innovative practices they propose to do to address the beetle epidemic. The NSIFS plan targets harvesting heavily infested and susceptible (high-risk) pine stands and modelled the implication of different initial harvest levels. The NSIFS model differs from the previous BCFS predictive model in that it uses local information about the epidemic and assumes active management intervention. In Scenario 1 of the NSIFS model, if the AAC harvest was directed at heavily infested and high risk stands, but the AAC were not increased, about 9.1 million cubic metres of heavily infested and high risk volumes would remain unharvested in 2011. In Scenario 2, if the AAC could be increased by 500 000 cubic metres, with increased harvests also targeted on infested and high risk stands, their model indicates an opportunity to contain the beetle infestation by 2010.

The BCFS regional entomologist agrees with the NSIFS plan that aggressive harvesting of heavily infested and high-risk stands may slow the spread of the beetle and lessen unsalvaged losses. However there is concern that the modelling assumptions are somewhat optimistic. For example, based on current information in the TSA, estimated

low over winter beetle mortality suggest the beetle may expand more rapidly than forecasted in the NSIFS model.

BCFS district staff are also concerned that a temporary 500 000 cubic metres AAC uplift may not be sufficiently high to effectively implement the district mountain pine beetle strategy. District staff are requesting a 1 000 000 cubic metre uplift to provide them with the flexibility they may need to respond to the current epidemic and to help prevent rapid expansion of the beetle.

BCFS prepared two sensitivity analyses, which are described more fully in the public discussion paper (as Figures 6 and 7), that respond to the emergency beetle AAC uplift issue. The sensitivity analyses assume all of the management constraints in the base case continue except for those in the integrated resource management resource emphasis area related cutblock adjacency and green-up. The sensitivity analysis models higher levels of retention (relative to the base case) in the IRM area where adjacency constraints have been removed.

The sensitivity analysis also assumes that pine-leading stands that are infested but are not harvested will experience a 15-year regeneration delay and that re-growth based on natural stand yield tables (using VDYP) will apply rather than the faster growing managed stand yields (using TIPSY). This underscores the important role that harvesting of infested stands, and their reforestation, in renewing the forests in the TSA with good quality stands in support of future timber supply.

One sensitivity analysis assumes the spread of the beetle infestation is projected at 50% per year for next 5 years and the AAC is increased by 0.5 million cubic metres to 2.34 million cubic metres for 5 years. In this sensitivity, after 5 years harvest levels drop to 1.94 million cubic metres (about 2.5% below the base case) in the mid-term with no long-term impact on timber supply. Under this scenario, all beetle-killed timber can be salvaged while they are still of merchantable sawlog quality.

The second sensitivity analysis assumes the beetle infestation continues to expand as we have experienced elsewhere in the province (i.e. the BCFS predictive model described earlier where management intervention is not effectively slowing the spread of the beetle). In this scenario, initial harvest levels are set at 2.84 million cubic metres -- about 1.0 million higher than the existing AAC. This initial harvest levels would need to decline to 1.54 million cubic metres in the mid-term (about 20% lower than the base case) with no long-term impact on timber supply. Even with this increased harvest level and the projected recovery of 8 million cubic metres of beetle-killed timber, about 13.5 million cubic metres of timber will still become unusable under this scenario due to low to moderate mortality throughout the TSA in dispersed stands often with a minor pine component. The sensitivity analysis does not harvest these dispersed stands to recover these losses as it would entail accelerated harvesting of live non-pine timber that are needed to provide mid-term timber supply. The benefit of increased initial harvest levels would be to allow for salvage harvesting of at least some pine and to help ensure harvested areas are reforested in support of future managed stands.

In reviewing this information with BCFS staff, I am hopeful that the aggressive management intervention, as reflected in district strategies and objectives, and the

NSIFS forestry plan, will in fact slow the spread of the beetle and lead to its control. There are a number of factors that suggest optimism in this regard. I am mindful of the AAC uplift determination for 1999 that led to similar aggressive action as currently proposed and which in fact did lead to beetle population reductions in the southern part of the TSA. I am impressed by current efforts that have directed about 85% of the harvest at the pine beetle epidemic. The Merritt TSA has an obvious spirit of cooperation amongst the major forest licensees, First Nations bands, the BCFS and other government agencies that will be needed to meet the current challenge. The TSA has benefited from considerable efforts and analysis by NSIFS and district staff to focus harvesting efforts on forest health issues and this will likely continue. Licensees have expanded their mill capacity in recognition of the need for an uplift to help contain the spread of the beetle, so there is a realistic opportunity to harvest levels above the current AAC and for licensees to carry out proposed practices in their forest plan. The diverse terrain conditions in the TSA may favourably support the success of aggressive and focussed harvesting efforts. And perhaps most importantly, there is strong general community and First Nations recognition and support for the need to increase harvest levels to address the current epidemic in an effort to contain the infestation.

I am also mindful, however, of how difficult it has been elsewhere in the province to contain the mountain pine beetle and that, even with aggressive intervention, the beetle populations could continue to expand. And that the Merritt TSA has an abundance of intermediate aged lodgepole pine that are vulnerable if aggressive action is not taken; these stands are a key component of the future wood supply in the TSA.

In recognition of this uncertainty and risk, and in considering all the information provided to me about the many factors that I need to consider in making my determination, I believe BCFS district staff should be provided with the flexibility they may need to effectively implement their mountain pine beetle strategy. I therefore recognize in my "Reasons for Decision" the need for an additional 1 million cubic metres per year for 5 years to address the mountain pine beetle epidemic in the Merritt TSA.

An uplift of this magnitude can cause environmental effects that need to be carefully addressed. However, no action may result in even larger effects caused by a rapidly expanding mountain pine beetle population. One tool that can help mitigate environmental effects is ensuring adequate levels of retention are left after harvesting to address biodiversity. Forest licensees and district staff in the Merritt TSA are working together to identify, and explain, not only what trees are being removed to reduce the effects of the beetle epidemic, but also what trees are being left behind that are needed to provide for stand- and landscape-level retention.

Reasons for Decision

In reaching my AAC determination for the Merritt TSA I have made all of the considerations documented above and have reasoned from them as follows.

The 2003 timber supply analysis base case projection indicates an initial harvest level of 1 994 671 cubic metres per year can be maintained for four decades. This is followed by a 10% per year decrease for two decades to a long-term harvest level of 1.66 million cubic metres per year.

In determining AACs, my considerations typically identify factors which, considered separately, indicate reasons why the timber supply may be either greater or less than the harvest levels projected for various periods in the base case. Some of these factors can be quantified and their implications assessed with reliability. Others may influence the assessment of the timber supply by introducing an element of risk or uncertainty, but cannot be quantified reliably at the time of the determination and must be accounted for in more general terms.

In my considerations, the following factors has been identified as reasons why the timber supply as projected in the base case may have been underestimated:

- *Utlization standards – small diameter stands*: There is higher utilization of small diameter pine stands than assumed in the timber supply analysis. This represents a 62 500 cubic metre upward pressure in timber supply in the short- and mid-term.

The following factors have been identified as reasons why the timber supply projected in the base case may have been overestimated:

- *Site productivity estimates – low-elevation even-aged stands*: I am satisfied that the timber supply analysis is generally correct by recognizing higher site indices for these low-elevation stands than estimated using the forest inventory. However to account for some risk and uncertainty in these estimates, I recognize a 21 000 cubic metres downward pressure on timber supply throughout the harvest forecast horizon.
- *Site productivity estimates – small diameter pine stands*: Adjusted site indices assumed in the timber supply analysis for small diameter pine stands are subject to greater uncertainty (relative to low-elevation stands) since they are not based on field samples in these stands. As a consequence I recognize a 80 000 cubic metres downward pressure on timber supply for this factor throughout the harvest forecast horizon.
- *Landscape-level biodiversity – old forest retention:* The timber supply analysis modelled a 3.9% reduction in timber supply to account for old forest retention requirements. Since the analysis was undertaken, draft old growth management areas (OGMAs) have been defined, and with some refinements, may soon be established. Current management practices are honouring these draft OGMAs. MSRM staff have estimated the timber supply impact of the draft OGMAs to be about 6% – or 2.1% higher than assumed in the base case. I therefore recognize a 2.1% –

about a 39 000 cubic metre – downward pressure in timber supply throughout the harvest forecast to account for this factor.

- *Wildlife tree patches:* The timber supply analysis assumed an overall volume reduction of 1.12% to account for wildlife tree retention. Agency staff believe this is too low. BCFS staff consider the 5.5% reduction applied in the 2001 timber supply analysis, and accepted in the previous AAC determination by the chief forester, as a more appropriate accounting for wildlife tree retention. To more appropriately account for the potential impacts of wildlife tree retention, I recognize a 4% (about 80 000 cubic metres per year) downward pressure on timber supply throughout the harvest forecast. This accounts for an undetermined but likely overlap between OGMAs and wildlife tree patches.

- *Identified wildlife:* The timber supply analysis took into an account an existing wildlife habitat area but did not model the timber supply impacts associated with future delivery of the Identified Wildlife Management Strategy in the TSA. I therefore recognize a 1% or 20 000 cubic metres downward pressure throughout the harvest forecast horizon to account for identified wildlife. A 1% volume reduction to account for this factor is typically assumed in most timber supply units.

- *Riparian management – temperature sensitive streams:* Temperature sensitive streams have been formally identified for portions of the TSA. To account for this factor, based on the information provided me, I recognize a very small 0.15% or 3000 cubic metre downward pressure on timber supply throughout the harvest forecast horizon.

The above list of factors identifies 7 areas of upward and downward pressure in the base case projection that I have considered in this determination. The 6 downward pressures represent about a 243 000 cubic metres impact on timber supply, with one upward pressure of 62 500 cubic metres. This leaves a net downward pressure of 180 500 cubic metres relative to the base case forecast of 1 994 671 cubic metres.

After carefully examining each of the relevant factors under section 8 of the *Forest Act* for the Merritt TSA, the assumptions made in deriving the base case harvest projection in the timber supply analysis, and factors that may have over- or under-estimated timber supply in the short-, mid- and long-term, it is my determination that a "base" AAC of 1 814 171 cubic metres can be supported in the TSA.

In addition to the "base" AAC I have determined that the Merritt TSA can support, and needs, an AAC uplift of an additional 1 000 000 cubic metres for 5 years to address the mountain pine beetle epidemic. This uplift acknowledges the need to take aggressive action in order to try and control the spread of the infestation, and also, if such action is unsuccessful, the need to salvage beetle-killed stands before they loose sawlog quality. The uplift provides BCFS district staff with the flexibility they may need to implement the district mountain pine beetle strategy and objectives.

This uplift volume is directed at forest stands identified in the Merritt TSA Harvest Eligibility Matrix (as amended by the district manager). These currently are infested

(attacked) stands and susceptible stands. Susceptible stands are pine-leading stands greater than 60 years of age occurring below 1700 metres in elevation.

Therefore the total AAC I have determined for the Merritt TSA for the next 5 years is 2 814 171 cubic metres. This includes continuation of a 312 500 cubic metre partition for small diameter pine stands. The partition is in recognition of the need to not avoid harvesting these difficult stands. The partition does not limit harvest levels for these stands, as more harvesting, for example through non-replaceable licenses, may be required to address the beetle epidemic in these areas.

Delivering this AAC will likely be predicated in part on the continued or expanded contribution of the small scale salvage program and I trust future apportionment decisions will reflect this contribution.

The Nicola-Similkameen Innovative Forestry Society (NSIFS) were responsible for timber supply analysis used to help support this determination. They deserve a great deal of credit for their efforts. The base case assumptions were well reasoned, and the sensitivity analyses provided the information I needed to assess the potential implications of uncertainties. The analysis they prepared in their recent forestry plan to address the mountain pine beetle epidemic was extremely useful.

I also greatly appreciate the considerable efforts of Cascades Forest District, Southern Interior Forest Region, Forest Analysis Branch and other BCFS and agency staff for their considerable efforts in support of this determination. They provided me with the information and analysis I needed to make this determination.

Considerable efforts were made in this urgent timber supply review to obtain public and First Nations feedback and several comments were received. I appreciate the many efforts made by First Nations and the public, under relatively short notice, to provide the feedback and input. These comments were an important consideration that I took into account in my determination.

Determination

I have considered and reviewed all the factors as documented above, including the risks and uncertainties in the information provided. It is my determination that a timber harvest level that accommodates objectives for all forest resources during the next five years and that reflects current management practices as well as the socio-economic objectives of the Crown, and the need to address the mountain pine beetle epidemic can be best achieved in the TSA by establishing an AAC of 2 814 171 cubic metres.

Within this total AAC of 2 814 171 cubic metres, a partition of 312 500 cubic metres is continued for smallwood pine stands.

This determination is effective July 1, 2005, and will remain in effect until a new AAC is determined, which must take place within five years of the effective date of this determination.

If additional significant new information is made available to me, major changes occur in the management assumptions upon which I have predicated this decision, or the mountain pine beetle outbreak progresses significantly differently than assumed in support of this

decision, then I am prepared to revisit this determination sooner than the five years required by legislation.

Implementation

In the period following this decision and leading to the subsequent determination, I encourage BCFS staff and licensees to undertake the tasks and studies noted below that I have also mentioned in the appropriate sections of this rationale document. I recognize that the ability of staff and licensees to undertake these projects is dependent on available resources including funding. These projects are, however, important to help reduce the risk and uncertainty associated with key factors that affect the timber supply in the Merritt TSA.

- *Unstable terrain and environmental sensitive areas (ESAs):* the timber supply analysis may have overestimated timber supply impacts when accounting for unstable terrain. Where terrain stability mapping exists, both Class 5 terrain and older ESA 1 mapping for unstable soils were deducted from the timber harvesting land base. I encourage completion of terrain stability mapping, subject to available resources and other priorities, so that this updated information can be fully used to account for unstable terrain (rather than older ESA soils mapping).

- *Smallwood pine – need for TSA re-inventory:* I encourage the regional executive director to work with Forest Analysis Branch to identify the need to re-inventory the Merritt TSA for consideration by the appropriate agency. A re-inventory is particularly needed so that opportunities for a smallwood partition can be identified before the current non-replaceable forest licenses expire in about 6 years.

- *Forest inventory – volume adjustments:* Standard procedures (Fraser Protocol) for adjusting inventory attributes based on phase 2 Vegetation Resource Inventory ground samples in the Merritt TSA led to problems and were therefore not used in the timber supply analysis. The problems with the use of the procedures needs to be better understood and addressed prior to the next timber supply analysis.

- *Single tree selection – dry-belt Douglas-fir stands:* The chief forester in the last determination encouraged staff to monitor dry-belt fir stands so that their level of contribution to timber supply can be more accurately assessed. This continues to be needed.

- *Silvicultural systems – lodgepole pine-Douglas-fir stands*: I encourage district staff and licensees to work together to improve information on retention levels and growth and yield, particularly in lodgepole pine – Douglas-fir stands. This information is needed so that timber supply implications can be better accounted for in future determinations.

- *Decay and waste – net volume adjustment factor:* I encourage completion of the NVAF sampling in the TSA as these results can be used to better account for decay and waste losses in support of future timber supply analyses.

- *Community watersheds:* Monitoring of forest practice performance in community watersheds is needed to evaluate the assumptions employed in the base case and to make any necessary refinements in support of subsequent determinations.
- *Cultural heritage resources – traditional use studies:* Completion of traditional use studies in the TSA is encouraged so that this information can be factored into future timber supply reviews, for example, through the identification of additional archaeological sites.
- *Disturbance of forests outside of timber harvesting land base:* A more appropriate accounting of disturbance of forests outside the land base is needed to support the next timber supply analysis given the role of these forests in achieving forest cover objectives for non-timber values and associated timber supply implications.

Jim Snetsinger
Chief Forester

June 24, 2005

Appendix 1: Section 8 of the *Forest Act*

Section 8 of the *Forest Act*, Revised Statutes of British Columbia 1996, reads as follows:

Allowable annual cut

8. (1) The chief forester must determine an allowable annual cut at least once every 5 years after the date of the last determination, for

(a) the Crown land in each timber supply area, excluding tree farm licence areas, community forest areas and woodlot licence areas, and
(b) each tree farm licence area.

(2) If the minister

(a) makes an order under section 7 (b) respecting a timber supply area, or
(b) amends or enters into a tree farm licence to accomplish the result set out under section 39 (1) (a) to (d),

the chief forester must make an allowable annual cut determination under subsection (1) for the timber supply area or tree farm licence area

(c) within 5 years after the order under paragraph (a) or the amendment or entering into under paragraph (b), and
(d) after the determination under paragraph (c), at least once every 5 years after the date of the last determination.

(3) If

(a) the allowable annual cut for the tree farm licence area is reduced under section 9 (3), and
(b) the chief forester subsequently determines, under subsection (1) of this section, the allowable annual cut for the tree farm licence area,

the chief forester must determine an allowable annual cut at least once every 5 years from the date the allowable annual cut under subsection (1) of this section is effective under section 9 (6).

(4) If the allowable annual cut for the tree farm licence area is reduced under section 9 (3), the chief forester is not required to make the determination under subsection (1) of this section at the times set out in subsection (1) or (2) (c) or (d), but must make that determination within one year after the chief forester determines that the holder is in compliance with section 9 (2).

(5) In determining an allowable annual cut under subsection (1) the chief forester may specify portions of the allowable annual cut attributable to

(a) different types of timber and terrain in different parts of Crown land within a timber supply area or tree farm licence area, and
(b) different types of timber and terrain in different parts of private land within a tree farm licence area.
(c) [Repealed 1999-10-1.]

(6) The regional manager or district manager must determine an allowable annual cut for each woodlot licence area, according to the licence.

(7) The regional manager or the regional manager's designate must determine a rate of timber harvesting for each community forest agreement area, in accordance with

(a) the community forest agreement, and
(b) any directions of the chief forester.

(8) In determining an allowable annual cut under subsection (1) the chief forester, despite anything to the contrary in an agreement listed in section 12, must consider

(a) the rate of timber production that may be sustained on the area, taking into account

(i) the composition of the forest and its expected rate of growth on the area,
(ii) the expected time that it will take the forest to become re-established on the area following denudation,
(iii) silviculture treatments to be applied to the area,
(iv) the standard of timber utilization and the allowance for decay, waste and breakage expected to be applied with respect to timber harvesting on the area,
(v) the constraints on the amount of timber produced from the area that reasonably can be expected by use of the area for purposes other than timber production, and
(vi) any other information that, in the chief forester's opinion, relates to the capability of the area to produce timber,

(b) the short and long term implications to British Columbia of alternative rates of timber harvesting from the area,

(c) [Repealed 2003-31-02.]

(d) the economic and social objectives of the government, as expressed by the minister, for the area, for the general region and for British Columbia, and

(e) abnormal infestations in and devastations of, and major salvage programs planned for, timber on the area.

1998-29-2;1999-10-1; 2000-6-2; 2002-25-21;

2003-30-01; 2003-31-02

Appendix 2: Section 4 of the *Ministry of Forests Act*

Section 4 of the *Ministry of Forests Act* (consolidated 1988) reads as follows:

Purposes and functions of ministry

4. The purposes and functions of the ministry are, under the direction of the minister, to

(a) encourage maximum productivity of the forest and range resources in British Columbia;
(b) manage, protect and conserve the forest and range resources of the government, having regard to the immediate and long term economic and social benefits they may confer on British Columbia;
(c) plan the use of the forest and range resources of the government, so that the production of timber and forage, the harvesting of timber, the grazing of livestock and the realization of fisheries, wildlife, water, outdoor recreation and other natural resource values are co-ordinated and integrated, in consultation and co-operation with other ministries and agencies of the government and with the private sector;
(d) encourage a vigorous, efficient and world competitive timber processing industry in British Columbia; and
(e) assert the financial interest of the government in its forest and range resources in a systematic and equitable manner.

Documents attached:

Appendix 3: Minister's letter of July 28, 1994

Appendix 4: Minister's memo of February 26, 1996

Appendix 5: List of Submissions and Responses Received

File: 10100-01

JUL 28 1994

John Cuthbert
Chief Forester
Ministry of Forests
595 Pandora Avenue
Victoria, British Columbia
V8W 3E7

Dear John Cuthbert:

Re: Economic and Social Objectives of the Crown

The *Forest Act* gives you the clear responsibility for determining Allowable Annual Cuts, decisions with far-reaching implications for the province's economy. The *Forest Act* provides that you consider the social and economic objectives of the Crown, as expressed by me, in making these determinations. The purpose of this letter is to provide this information to you.

The social and economic objectives expressed below should be considered in conjunction with environmental considerations as reflected in the Forest Practices Code, which requires recognition and better protection of non-timber values such as biodiversity, wildlife and water quality.

The government's general social and economic objectives for the forest sector are made clear in the goals of the Forest Renewal Program. In relation to the Allowable Annual Cut determinations you must make, I would emphasize the particular importance the government attaches to the continued availability of good forest jobs and to the long-term stability of communities that rely on forests.

Through the Forest Renewal Plan, the government is taking the steps necessary to facilitate the transition to more value-based management in the forest and the forest sector. We feel that adjustment costs should be minimized wherever possible, and to this end, any decreases in allowable cut at this time should be no larger than are necessary to avoid compromising long-run sustainability.

.../2

Province of British Columbia
Minister of Forests
Parliament Buildings
Victoria, British Columbia
V8V 1X4

In addition to the provincial perspective, you should also consider important local social and economic objectives that may be derived from the public input on the Timber Supply Review discussion papers where these are consistent with the government's broader objectives.

Finally, I would note that improving economic conditions may make it possible to harvest timber which has typically not been used in the past. For example, use of wood from commercial thinnings and previously uneconomic areas may assist in maintaining harvests without violating forest practices constraints. I urge you to consider all available vehicles, such as partitioned cuts, which could provide the forest industry with the opportunity and incentive to demonstrate their ability to utilize such timber resources.

Yours truly,

Andrew Petter
Minister

Province of British Columbia
Ministry of Forests
OFFICE OF THE MINISTER

MEMORANDUM

File: 16290-01

February 26, 1996

To: Larry Pedersen
Chief Forester

From: The Honourable Andrew Petter
Minister of Forests

Re: **The Crown's Economic And Social Objectives Regarding Visual Resources**

Further to my letter of July 29, 1994, to your predecessor, wherein I expressed the economic and social objectives of the Crown in accordance with Section 7 of the *Forest Act*, I would like to elaborate upon these objectives as they relate to visual resources.

British Columbia's scenic landscapes are a part of its heritage and a resource base underlying much of its tourism industry. They also provide timber supplies that are of significant economic and social importance to forest industry dependent communities.

Accordingly, one of the Crown's objectives is to ensure an appropriate balance within timber supply areas and tree farm licence areas between protecting visual resources and minimizing the impact of such protection measures on timber supplies.

As you know, I have directed that the policy on management of scenic landscapes should be modified in light of the beneficial effects of the Forest Practices Code. In general, the new policy should ensure that establishment and administration of visual quality objectives is less restrictive on timber harvesting. This change is possible because alternative harvesting approaches as well as overall improvement in forest practices will result in reduced detrimental impacts on visually sensitive areas. Also, I anticipate that the Forest Practices Code will lead to a greater public awareness that forest harvesting is being conducted in a responsible, environmentally sound manner, and therefore to a decreased public reaction to its visible effects on the landscape. In relation to the Allowable Annual Cuts determinations that you make, please consider the effects that the new policy will have in each Timber Supply Area and Tree Farm Licence.

.../2

In keeping with my earlier letter, I would re-emphasize the Crown's objectives to ensure community stability and minimize adjustment costs as the forest sector moves to more value-based management. I believe that the appropriate balance between timber and visual resources will be achieved if decisions are made consistent with the ministry's February 1996 report *The Forest Practices Code: Timber Supply Analysis*.

Finally, in my previous letter I had asked that local economic and social objectives be considered. Please ensure that local views on the balance between timber and visual resources are taken into account within the context of government's broader objectives.

Andrew Petter
Minister of Forests

Appendix 5: List of Submissions and Responses Received

First Nations*

Coldwater Indian Band
Cook's Ferry Band
Lower Nicola Indian Band
Lower Similkameen Indian Band
Nicola Tribal Association
Nooaitch Indian Band
Shackan Indian Band
Siska Indian Band
Upper Nicola Indian Band
Upper Similkameen Indian Band
Westbank Indian Band

*includes attendees at meetings

Organizations

City of Merritt
Communities Future Development Centre, Merritt
Merritt Chamber of Commerce
Merritt Tourism and Economic Development Committee
Nicola Valley Stock Breeders Association
Princeton Community Skills Centre
Public Advisory Group, Nicola-Similkameen Innovative Forestry Society
Sierra Club of Canada – BC Chapter
Town of Princeton

Forest industry

Ardew Wood Products

Public

Katharine Schewchuk (Member, Nicola Watershed Community Roundtable)

Government agencies

BC Forest Service
Ministry of Sustainable Resource Management
Ministry of Water, Land and Air Protection

Open Houses

Comments were received at two open houses:

- Princeton, April 19, 2005 – 20 attendees
- Merritt, April 20, 2005 – 26 attendees